SERVICE MANUAL

H SERIES

HAMMOND ORGAN COMPANY
DIVISION OF HAMMOND CORPORATION
1740 N. 25th Avenue • Melrose Park, Ill. 60160
312—378-5472 • 312—345-3100

NOTE

Beginning with Serial No. 15000, several significant circuit changes have been incorporated in the Hammond Series H-100 organs. For information covering the new circuits, see pages 55 through 60, and Figures 45 through 64.

H-300

The H-300 organ is basically the H-Series above Serial Number 15,000 with Auto Rhythm built-in. For information covering the new circuits, see pages 58 and 58A, and Figures 68 through 78.

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INTRODUCTION

This manual contains service information concerning H-100 Series organs. The organs are of three distinct types; H-100 below Serial No. 15,000, H-100 Serial No. 15,000 and up, and H-262.

Model H-262 is an institutional organ, electrically similar to H-100 instruments above Serial No. 15,000. However, certain features have been omitted, and others have been added, as indicated below:

OMITTED	ADDED
Reiteration on Percussion	Celesta
Marimba	Nazard (3rd Harmonic)
Xylophone	Bells
Banjo	
Brush	
Cymbal	
Guitar	
Vibrato Cancel Switch on Swell Pedal	
Glock	

The DULCIANA 8' tab has been relocated to the upper manual. Several of the tabs and presets have been renamed, and several of the voices and presets have been modified for compatibility with liturgical music.

A new Percussion Driver, P/N 128-000002 is used in Model H-262. The HARP voices in H-262 are pitched one octave lower than in H-100.

All pertinent Service Bulletins issued through December 1969 are incorporated in this manual.



FIGURE 1. TYPICAL H-100 SERIES INSTRUMENT

DIMENSIONS: 50" HIGH, 26-1/2" DEEP AND 50" HIGH WITH MUSIC RACK
WEIGHT: 445 LBS. WITH PEDALS AND BENCH
INPUT: 117 VOLTS, 60 CYCLE A.C. - 340 WATTS
POWER OUTPUT, 60 WATTS E.I.A.

GENERAL DESCRIPTION

H-100 SERIES

The Hammond H-100 series organ is a completely self-contained console, requiring no external tone cabinet. It has two manuals or keyboards of 61 keys each, a 25 note pedal keyboard, and an expression (or swell) pedal for controlling the volume. All tones are produced by electro-magnetic tone generators and electronically amplified, as in other models of the Hammond Organ. Selection of tone colors is made by adjusting 46 drawbars, 7 prevoiced tabs and 18 preset keys. Other characteristics of the music are adjusted by means of 21 other tabs. A switch on the expression pedal when operated turns off any vibrato effect set up on the tabs. A toggle switch located to the left of the console above the manual is used to turn on the organ. A pilot light shows when the organ is turned on.

Figure 1 shows the front of the console and Figure 2 is a rear view, with the back cover removed.

INSTALLATION AND MAINTENANCE

(See Back Cover)

A card, packed with the playing instructions, gives full information on installing the organ, oiling, and packing for moving or shipment. After reading this card, the owner may wish to attach it to the underside of the organ bench top for future reference.

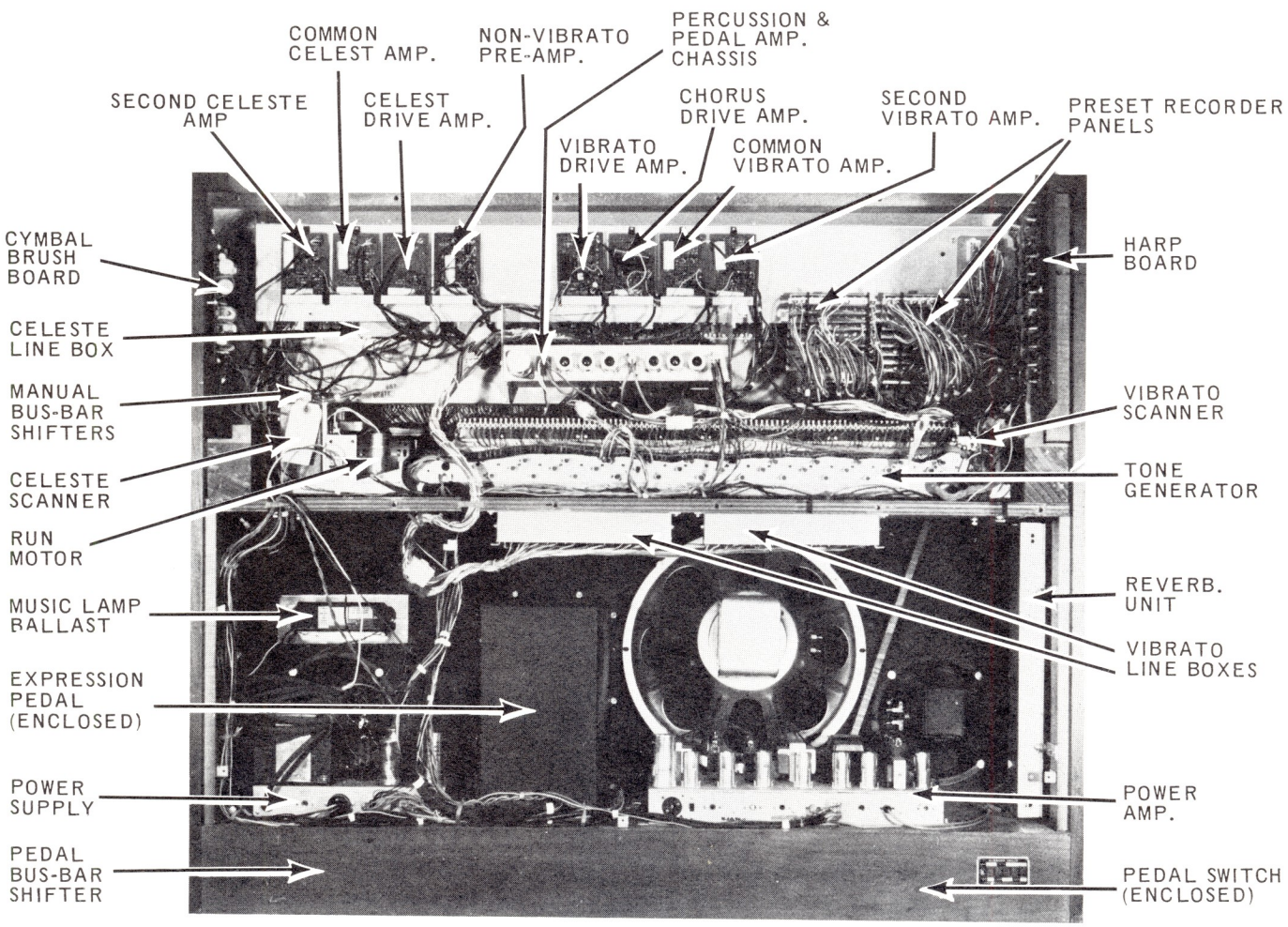


FIGURE 2. REAR VIEW WITH BACK COVER REMOVED

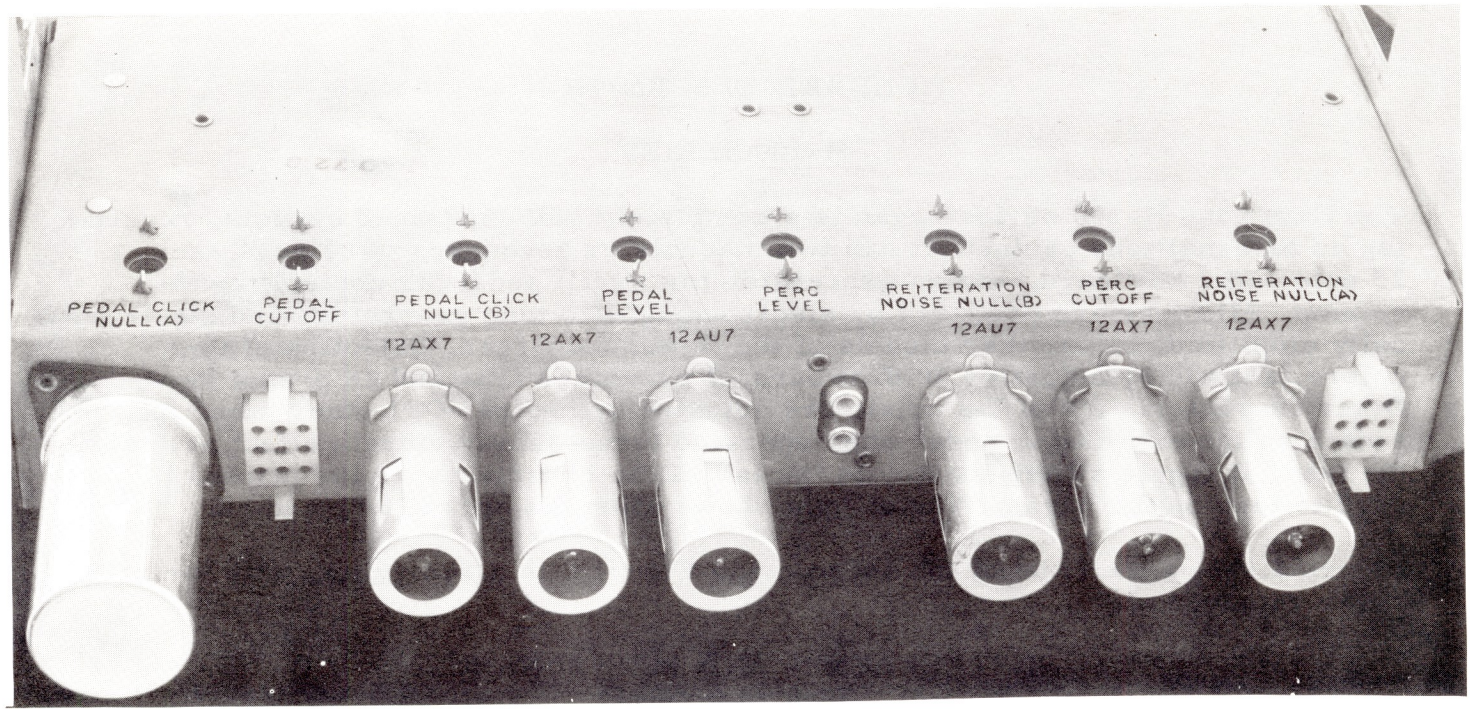


FIGURE 3. CONSOLE PREAMPLIFIER



FIGURE 4. POWER AMPLIFIER

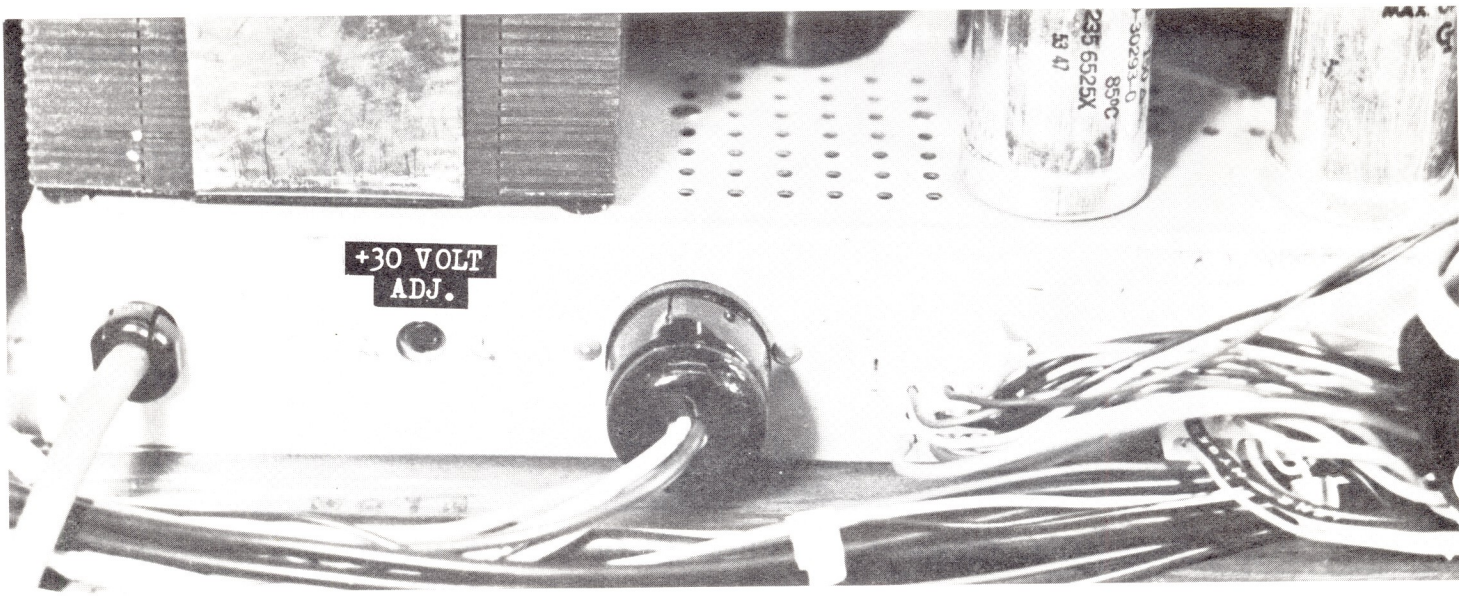


FIGURE 5. POWER SUPPLY CHASSIS

NOTICE: If tests indicate that an adjustment of the control settings is necessary, proceed as outlined on the following 3 pages. For control locations see figures 3, 4, and 5.

ADJUSTMENT PROCEDURES

To properly make the following adjustment settings, you should have the following equipment:

1. An AC VTVM such as Simpson Model 715 for $75.00, or a Heathkit Model IM-21 for $34.00 in "kit" form, or Model IMW-21 for $53.00 "Ready Built".
2. A Quality Volt OHM Meter, such as Simpson Model 260-5 for $58.00.

We have found a single meter, Heathkit Model IM-25, in "kit" form for $80.00 or Model IMW-25 "Ready Built" for $115.00 to be an acceptable substitute for both the above meters.

Before adjustments can be made it will be necessary to:

1. Remove console back cover.
2. Remove screw that secures Harp Assembly to preamplifier, and swing Harp Assembly out.
3. Remove console top.
4. Remove the two covers located on the rear of the Control Panel Assembly.
5. Remove the top cover of the Control Panel Assembly.

NOTE: Before making any AC output adjustment, make the following DC settings.

1. Check the collector voltage of the finned transistor on the vibrato drive board. The case of this transistor is the collector. If the collector voltage is not 70 volts, adjust the bias control near this transistor so that 70 volts is attained.

   Depress any STRING BASS tab. Press and release any pedal. Adjust +30 volt control on power pack so that +18 volts* appears between pin 6 of plug P-702 (positive) and ground. *On later series instruments (those which have additional contacts on lowest 8 notes when using 16' mellow drawbar) set control for 14 volts instead of 18 volts.

NOTE: Keys or pedals called by number are counted from low note end of the organ.

OUTPUT AND BALANCE SETTINGS

All of the following settings are made with: A. Swell Pedal wide open.

B. All tabs UP, except as specified.

Later model H-100 organs with power amplifiers coded G and above, incorporate Concentric Level controls for the A and B channels. The inner control is accessible by inserting a screwdriver through the hole in the outside Pot, and adjusts the level of the signal being fed to the tone cabinet outlet.

The outer controls adjust the level of the console speakers only. To adjust the tone cabinet levels, connect a 47K ohm load between pin 1 and ground (channel A) of the tone cabinet outlet. Connect meter across the load and adjust proper control for an indication of 0.17V rms. Repeat for Channel B with load and meter connected between pin 7 of the tone cabinet outlet and ground.

ORGAN ADJUSTMENT PROCEDURES

The following Tables, I, II and III describe the step-by-step procedures to be followed when adjusting H-Series organs. Use the table applicable to the particular model being adjusted.

For all adjustments, the following conditions should prevail:

a. Swell pedal set for maximum output.

b. TONE control on power amplifier at midpoint of travel.

c. The following controls (if present) fully clockwise:

1. Percussion
2. Pedal Level
3. Reiteration Rate

NOTE

Channel A speaker is at the extreme left (rear view) of the organ.
Channel B speaker is at extreme right (rear view) of the organ.

TABLE I
ADJUSTMENT PROCEDURES, H-100 ORGANS BELOW SERIAL NO. 15,000

STEP	METER ACROSS SPEAKER CHANNEL	DEPRESS PRESET	DEPRESS TAB	DRAWBAR OR REGISTRATION	PLAY KEY (S) NO. (S)	ADJUST	METER INDICATION
1	B	Upper Manual B	None	No. 4 of Upper Manual B Group	25	Channel B Level	0.54V rms
2	B	Upper Manual B	ON UPPER	No. 4 of Upper Manual B Group	25	Vibrato Gain	0.54V rms
3	B	Upper Manual B	None	No. 9 of Upper Manual B Group	48	Tone Control	0.14V rms
4	A	Upper Manual B	None	No. 4 of Upper Manual B Group	25	Channel A Level	0.54V rms
5	Bass	Upper Manual B	None	No. 1 of Upper Manual B Group	25	Bass Level	1.5V rms
6a	A	Upper Manual B	ON UPPER	000 6070 8000 (Upper Manual B Group)	13, 14, 15, 16, 17	N/A	Note
6b	A	Upper Manual B	ON UPPER REVERB I REVERB II	Same as Step 6a	Same as Step 6a	Reverberation Level	Same as noted in Step 6a
7a	A	Upper Manual A#	None	No. 4 of Upper Manual A Group	13, 15, 17,	N/A	Note
7b	A	Upper Manual B	HARP SUSTAIN	None	13, 15, 17,	Hum Level	Same as noted in Step 7a ± 1½ db
8	N/A	Upper Manual B	BANJO	None	25	Percussion Cutoff	Signal barely audible
9a	A	Upper Manual A#	BANJO SECOND VOICE	000 7888 8800 (Upper Manual A# Group)	25	N/A	Note
9b	A	Upper Manual B	Same as Step 9a	Same as Step 9a	25	Percussion Level	Same as noted in Step 9a ± 1½ db
10a	A	Upper Manual B	Same as Step 9a	None	Middle CEG chord at 5 strokes per second	N/A	Note maximum swings
10b	A	Upper Manual	BANJO	None	Same as	Reiteration Drive	Same as noted in

		Manual B					audible
9a	A	Upper Manual A#	BANJO SECOND VOICE	000 7888 8800 (Upper Manual A# Group)	25	N/A	Note
9b	A	Upper Manual B	Same as Step 9a	Same as Step 9a	25	Percussion Level	Same as noted in Step 9a ± 1½ db
10a	A	Upper Manual B	Same as Step 9a	None	Middle CEG chord at 5 strokes per second	N/A	Note maximum swings
10b	A	Upper Manual B	BANJO	None	Same as Step 10a	Reiteration Drive	Same as noted in Step 10a
11	Bass	Upper Manual B	BANJO REITERATION	None	Partially depress the highest key on the upper manual to the point where the reiteration thump is heard. Wedge key in this position.	Reiteration Noise Nulls A & B	Minimum audible keying thump & meter indication
12	Bass	None	STRING BASS I or II	All pedal drawbars	Depress & release highest pedal	Pedal Cutoff	Note becomes inaudible
13	Bass	None	STRING BASS I or II	Pedal Drawbar No. 1	Pedal No. 13	Pedal Level	6.0V rms
14	Bass	None	None	None	Any pedal repeatedly	Pedal Click Nulls A & B	Minimum audible thump and meter indication
15	B	None Set BRUSH-CYMBAL volume control fully clockwise	CYMBAL PEDAL	None	Any pedal repeatedly, rapidly	CYMBAL LEVEL (on Brush & Cymbal board)	Meter reading fluctuates Average 2.5V rms
16	B	Same As Step 15	BRUSH	None	Any 3-key chord repeatedly, rapidly	BRUSH LEVEL	Same as Step 15.
17a	Bass	None	None	None	None	(All metal covers in place)	Hum & noise less than 0.040V rms
17b	A or B	None	None	None	None		Hum & noise less than 0.015V rms

TABLE II
ADJUSTMENT PROCEDURES, H-100 ORGANS SERIAL NOS. 15,000 AND ABOVE

Perform all steps of Table I, EXCEPT 10 and 14,

TABLE III
ADJUSTMENT PROCEDURES, MODEL H-262

STEP	METER ACROSS SPEAKER CHANNEL	DEPRESS PRESET	DEPRESS TAB	DRAWBAR REGISTRATION	PLAY KEY (S) NO. (S)	ADJUST	METER INDICATION
1	Same as Step 1, Table I						
2	B	Upper Manual B	ON SWELL	No. 4 of Upper Manual B Group	25	Vibrato Level	0.54 Vrms
3	Same as Step 3, Table I						
4	Same as Step 4, Table I						
5	Same as Step 5, Table I						
6	A	Upper Manual B	ON SWELL REVERB I REVERB II	000 6070 8000 (Upper Manual B Group)	13, 14, 15, 16, 17	Reverberation Level	1.6V rms (± 1½ db)
7a	A	Upper Manual A#	None	No. 3 of Upper Manual A#group	13, 15, 17	N/A	Note
7b	Same as Step 7b, Table I						
8	N/A	Upper Manual B	NAZARD	None	25	Percussion Cutoff	Signal barely audible
9a	A	Upper Manual A#	NAZARD SECOND VOICE	000 0800 0000 (Upper Manual A#Group)	25	N/A	Note
9b	A	Upper Manual B	Same as Step 9a	Same as Step 9a	25	Percussion Level	Same as noted in Step 9a (± 1½ db)
10	Same as Step 12, Table I						
11	Same as Step 13, Table I						
12a&b	Same as Step 17 a & b, Table I						

HOW THE ORGAN WORKS

To turn on the organ, lift the switch to "ON" position. To turn off the organ, push the switch downward to its "OFF" position.

Most tone sources, such as strings, reeds, or pipes, produce complex tones. The Hammond tone-producing mechanism, however, generates individual frequencies which can be combined by means of harmonic drawbars to produce any desired tone quality. The block diagram, (figure 41) shows the chief components of the instrument.

Electrical impulses of various frequencies are produced in the "tone generator assembly" which contains a number of "tone wheels" driven at predetermined speeds by a motor and gear arrangement. Each tone wheel is a steel disc similar to a gear, with high and low spots, or teeth, on its edge. As the wheel rotates, these teeth pass near a permanent magnet, and the resulting variations in the magnetic field induce a voltage in a coil wound on the magnet. This small voltage, when subsuitably filtered, produces one note of the musical scale, its pitch or frequency depending on the number of teeth passing the magnet each second.

A note played on either manual of the organ consists of a fundamental pitch and a number of harmonics, or multiples of the fundamental frequency. The fundamental and harmonics available on each playing key are controlled by means of drawbars. By suitable adjustment of these controls the player may vary the tone colors at will. Several pre-selected tones are also available by use of the preset keys: Various special effects are made available by use of the tabs.

Mixed tones from either the upper manual or the lower manual may go through either the "vibrato" portion or the "non-vibrato" portion of the preamplifier, depending on the position of the corresponding "Vibrato ON" tabs. The tones are then combined and pass through the expression control and additional stages of amplification before reaching the speakers.

A "Cymbal" effect is available through the foot pedals with the "Cymbal Pedal" tab depressed, while a "Brush" effect on both upper and lower manuals is available by depressing either, or both the "Brush Upper" and "Brush Lower" tabs.

Both of these effects are introduced into the overall signal at the power amplifier input.

At the left of each manual are twelve keys identical to the playing keys except reversed in color (figure 6). When a preset key is depressed it locks down and is released only when another is depressed. The exception to this is the cancel key at the extreme left, which serves only to release any key which may be locked down. Only one preset key is used at one time. If, by mistake, two are depressed and locked, they may be released by means of the cancel key. Each preset key, with the exception of the two "Adjust" keys at the extreme right of the group, makes available a different tone color which has been set up on the preset panel located inside the console. These tone colors are set up at the factory in accordance with a standard design which has been found to best meet the average organist's requirements. They may be changed, if desired, by removing the back of the console and changing the preset panel connections in accordance with instructions on a card located near the preset panel.

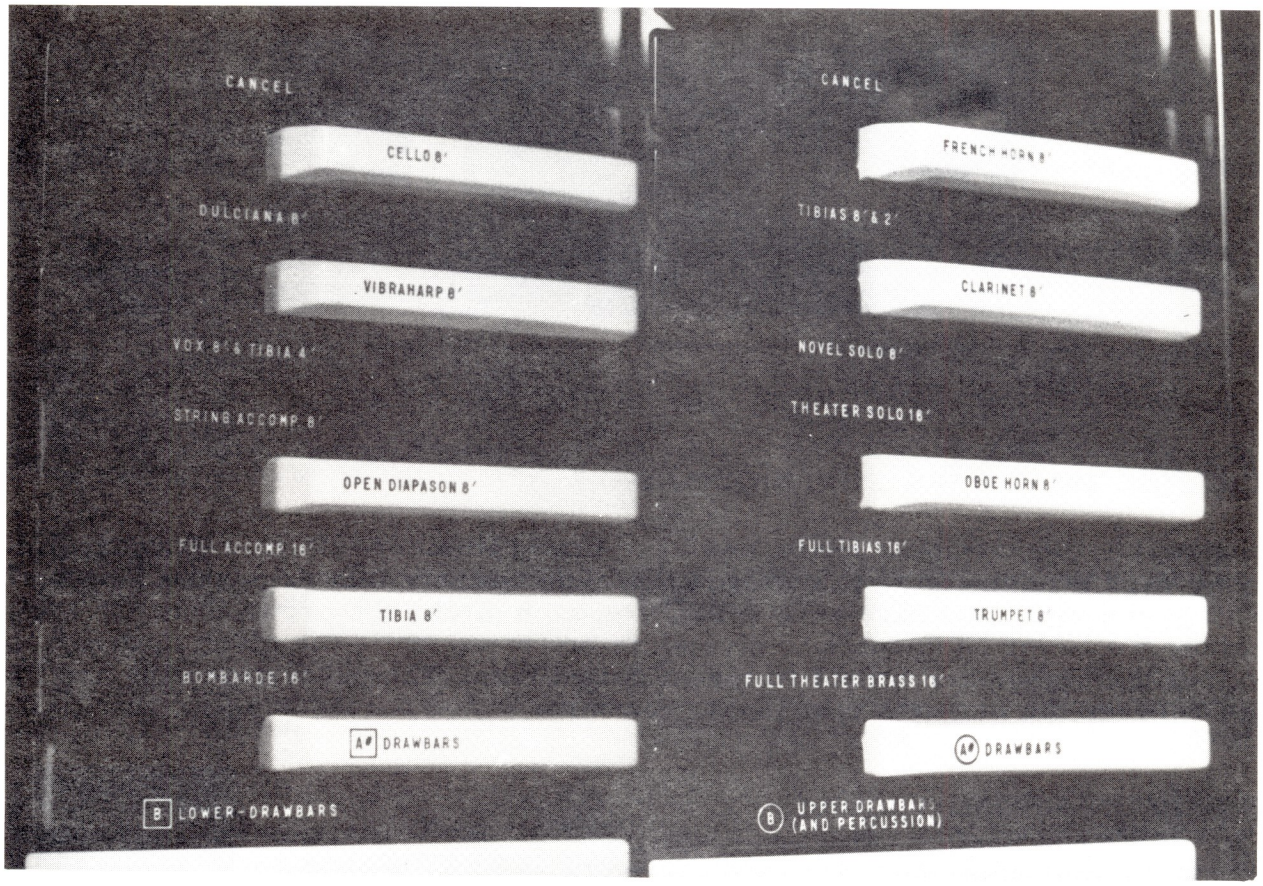


FIGURE 6. PRESET KEYS

When either "Adjust" key is depressed, the organ speaks with whatever tone color is set up on the harmonic drawbars associated with that key. The percussion voices can be used only when the upper manual "B" preset key is depressed. (See "Percussion Tabs" also).

Each console has four sets of harmonic drawbars, two for each manual, figure 7 shows one group of harmonic drawbars, by which the organist is enabled to mix the fundamental and any, or all, of twelve different harmonics in various proportions. (Note: The lower manual does not have the 10th. & 12th. harmonics.) The third bar from the left controls the fundamental, and each of the other bars except the two on the right, is associated with a separate harmonic. The second bar from the right combines the 7th. & 9th. harmonics, while the first bar on the right controls the 10th. & 12th. harmonics. If a drawbar is set all the way in, the harmonic it represents is not present in the mixture, each drawbar may be set in eight different positions by the organist in addition to the silent position. Each position, as marked on the drawbars, represents a different degree of intensity of the harmonic it controls. When drawn out to position 1, the harmonic it represents will be present with minimum intensity; when drawn out to position 2, with greater intensity; and so on up to position 8.

A tone color is logged by noting the numerical position of the various drawbars. For instance, the tone set up in figure 7 is known as Tone 33545124422. After a tone is logged it may be made available again by setting the harmonic drawbars to that number.

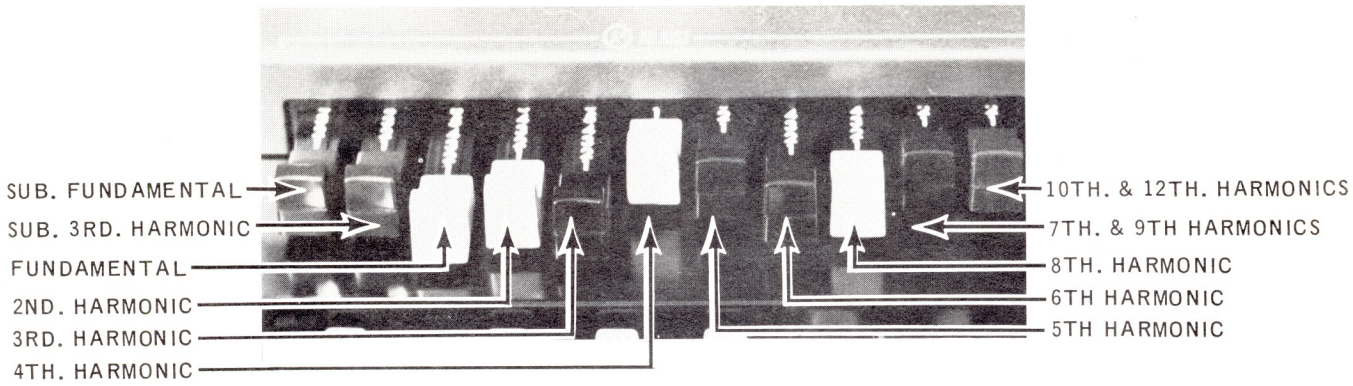


FIGURE 7. HARMONIC DRAWBARS

HARMONIC DRAWBARS FOR THE PEDALS

In the pedals the harmonic resources have been combined into four drawbars which may be used separately or in combination. The two left drawbars have a basic 16' pitch and the right two have an 8' pitch, for each pitch, the brown drawbar emphasizes the lower harmonics to give a mellow tone, while the black drawbar emphasizes the higher harmonics to give a bright tone. The pedal drawbars are located between the two sets of manual drawbars.

EXPRESSION PEDAL

The expression pedal, sometimes referred to as "Swell Pedal" (figure 8) is operated by the player's right foot to control the volume of the instrument. The pedal controls two channels simultaneously: One for the "BRUSH-CYMBAL" and organ "B" channel and the other for the organ "A" channel.

The volume is controlled by a variable shutter on the pedal moving between a light source and two photocells. The amount of light reaching the photocells is determined by the position of the shutter. Maximum light produces minimum resistance in the photocell; therefore, minimum volume.

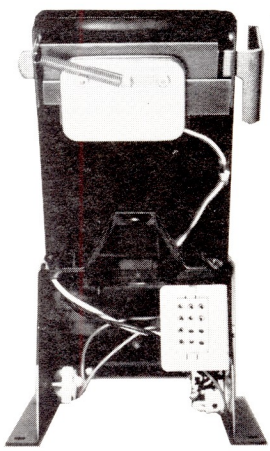


FIGURE 8.
SWELL CONTROL

PERCUSSION TABS

There are 11 of these tabs (figure 9) plus a reiteration rate control. The first tab on the left "second voice", when depressed converts the percussion voices into sustained tones so that they will continue to sound as long as a key is held down. The second tab "Touch Control", when depressed, introduces the "Touch Response" percussion mode, in which the keys must be played in a detached manner to make the percussion voice operate. With this tab up, each note will sound as it is pressed, and repeat whatever other keys are depressed. The next six tabs are prevoiced percussive voices, each creating the effect associated with the instrument indicated on the: Individual tab. The next tab, when depressed, turns on the reiterator circuit, and it's rate is controlled by the reiteration rate control. The next tab produces a sustained harp voice which differs from the other percussion voices, in that it begins to decay after a key has been released. The last tab, when depressed, adds vibrato to any of the above mentioned percussion voices only. Operation of the electrical circuits associated with these features is described in subsequent paragraphs.

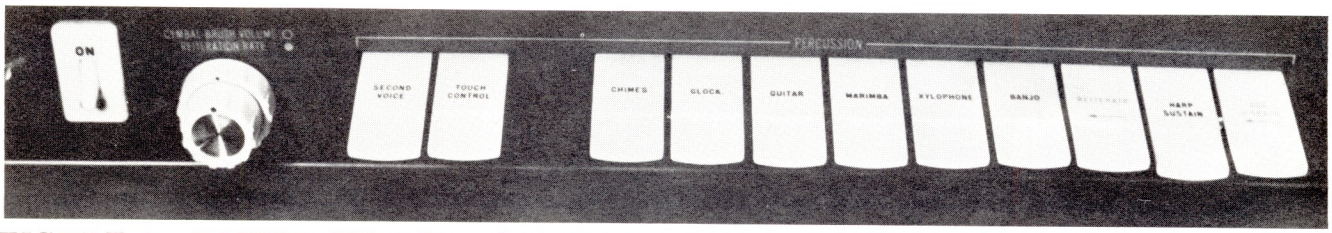


FIGURE 9. POWER SWITCH, CYMBAL-BRUSH, REITERATION RATE CONTROLS & PERCUSSION TABS

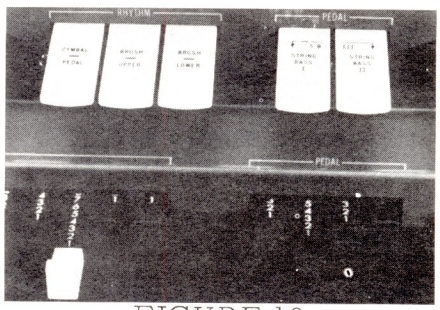


FIGURE 10. RHYTHM & PEDAL TABS

RHYTHM TABS

There are three tabs in this group (figure 10). The "Cymbal pedal" tab, when depressed, introduces a cymbal effect to the foot pedals in addition to the tones selected by the pedal drawbars. The "Brush Upper" tab, when depressed, introduces a brush effect to the upper manual in addition to any other tones selected by drawbars or preset keys. The "Brush Lower" tab performs the same function on the lower manual. Operation of the electrical circuits associated with these features is described in subsequent paragraphs.

Note: An overall level control for brush and cymbal is located at the left end of the control panel.

PEDAL TABS ("STRING BASS")

These two tabs (figure 10) when depressed, provide pedal decay in three degrees for a string bass effect. "String Bass I" provides a short decay, "String Bass II" provides a longer decay and a combination of the two provides an even longer decay period. Operation of the electrical circuits associated with this feature is described in subsequent paragraphs.

VIBRATO TABS

H-100 Series organs are equipped with selective vibrato, using five tabs to vary the vibrato effects. Two tabs relate to selectivity; depressing the "On Upper" tab introduces vibrato into the upper manual and depressing the "On Lower" tab introduces vibrato into the lower manual and pedals (figure 11).

"Vibrato I" tab, when depressed, produces the first degree of vibrato. A second or wider degree of vibrato is produced when "Vibrato II" tab is depressed, and a third degree of vibrato is produced when both tabs are in the "UP" position. Note: the above two tabs are mechanically interlocked so that both cannot be depressed at the same time.

The "Dual Vibrato" tab, when depressed, adds the second half of the vibrato scanner rotor, feeding it through a separate channel, creating an enriched, stereo vibrato.

The "Chorus" tab, when depressed, introduces some straight signal along with the vibrato, creating a chorus effect. The "Celeste" tab, when depressed, cuts out vibrato I, II and III and creates a slow wavering effect. "Dual Vibrato" can be added to it if desired. In addition, there is a spring loaded "Vibrato Cancel" switch on the expression pedal which, when operated, cancels all vibrato effects.

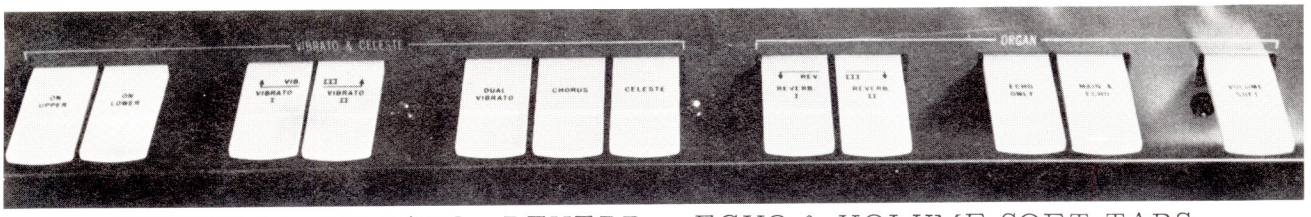


FIGURE 11. VIBRATO, REVERB., ECHO & VOLUME SOFT TABS

REVERBERATION TABS

The two reverberation tabs, when depressed, make available three degrees of reverberation. "Reverb. I" produces a small amount, "Reverb. II" a larger amount, and with both tabs depressed an even larger amount, entitled "Reverb. III". (figure 11).

ECHO TABS

The H-100 series organs have a built-in echo switch consisting of two tabs, "Echo Only" and "Main & Echo". When the "Echo Only" tab is depressed, the console speaker system does not sound, permitting only the tone cabinet or cabinets to sound. When the "Main & Echo" tab is depressed, the tone cabinet and the console speaker systems are activated. With both tabs "UP, only the console will sound. There is also a slide switch on the rear panel of the power amplifier which, when in the "UP" position, disables both of the echo tabs, if the organ is to be used alone.

VOLUME SOFT TAB

The "Volume Soft" tab, when depressed, reduces the overall volume level available, in order to permit playing at reduced volume while still maintaining the full dynamic range of the expression pedal.

AMPLIFICATION SYSTEM

The large chassis located on the right side of the lower console shelf (figure 2) contains the reverberation driver, reverberation pre-amplifier, channel "A" amplifier, channel "B" amplifier, bass amplifier, and tone cabinet drive amplifier.

The smaller chassis on the left side of the lower console shelf contains the power supply.

The large chassis mounted on the center rear of the manual chassis contains the percussion amplifier and the pedal amplifier.

Mounted on the rear cover of the control panel under two shielding covers, are eight printed circuit boards (figure 2). They are as follows; from left to right, second celeste amplifier, common celeste amplifier celeste drive amplifier, non-vibrato pre-amplifier, vibrato drive amplifier, chorus drive amplifier, common vibrato amplifier and second vibrato amplifier. Mounted on the upper end of the left inside console panel is a printed circuit board. It contains the cymbal-brush generator, keyers and shapers.

Hinged to the upper right of the console is a panel containing five printed circuit boards. The four boards from the left (figure 13) and a portion of the fifth board are keyers. The balance of the fifth board contains a two stage harp pre-amplifier.

Operation of the electrical circuits associated with the above systems are described in subsequent paragraphs.

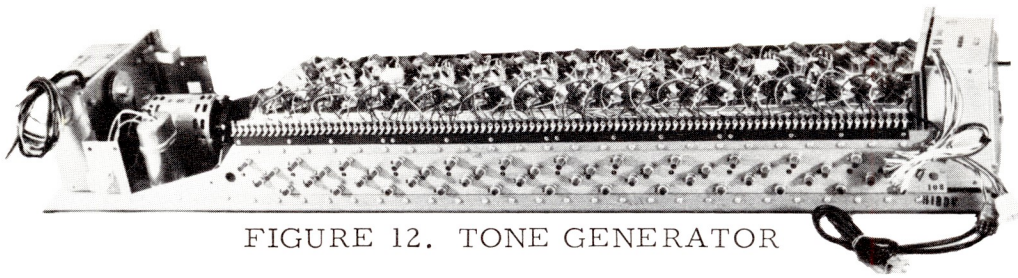


FIGURE 12. TONE GENERATOR

CONSTRUCTION AND OPERATION OF COMPONENTS

In studying this section, refer to the schematic circuit of the entire organ, (figure 40 and 41). Connections between components are shown in the wiring diagram, (figure 43).

TONE GENERATOR

All tones of the organ except cymbal and brush effect originate as electrical signals in the tone generator assembly. It contains 96 tone wheels having various numbers of teeth, with suitable gears for driving them at various speeds from a main shaft extending along the center. Each pair of tone wheels is mounted on a shaft and between them is a bakelite gear held by a coil spring, forming a mechanical vibration filter. As the gear is not rigidly attached to the shaft, any pair of wheels which may be stopped accidentally will not interfere with the operation of the others.

The tone generator assembly is driven at constant speed by a self starting synchronous motor, operating at 1800 RPM, located at the left side as you look in at the back of the console (figure 2). (In 50 cycle organs, the generator speed is 1500 RPM.)

Adjacent to each tone wheel is a magnetized rod with a pick-up coil wound on it. These magnets extend through the front and back of the generator, and are held by set screws which can be loosened in case adjustment is ever necessary. Figure 15 shows where to find the magnet for any frequency number. In this drawing the dotted lines indicate frequencies whose tone wheels are on the same shaft.

On top of the tone generator assembly are small transformers and capacitors, forming tuned filters for the higher frequencies. They are not likely to need replacing. In case one filter becomes inoperative, both the transformer and condenser must be replaced with a matched set from the factory. Figure 14 shows the location of these filters. A few frequencies use untuned filters consisting of coils alone, and some use resistors and capacitors.

Wires from the various filter assemblies lead to the terminal strip on the long edge of the generator.

The output frequencies of the tone generators are numbered, for convenience, in order of increasing frequency. The lowest, number 1, is about 32 cycles per second, and the highest, number 96, is about 8000 cycles per second. Frequency numbers 1 to 68 are used by the manuals and pedals, while frequencies 69 thru 96 are used by the manuals only. Figure 14 showing filter locations also shows the termination point of each frequency, while (figure 40 and 41) shows typical tuned and untuned tone generators.

In case any generator frequency is weak or absent, refer to "Practical Service Suggestions" for the procedure to be used in locating and correcting the trouble.

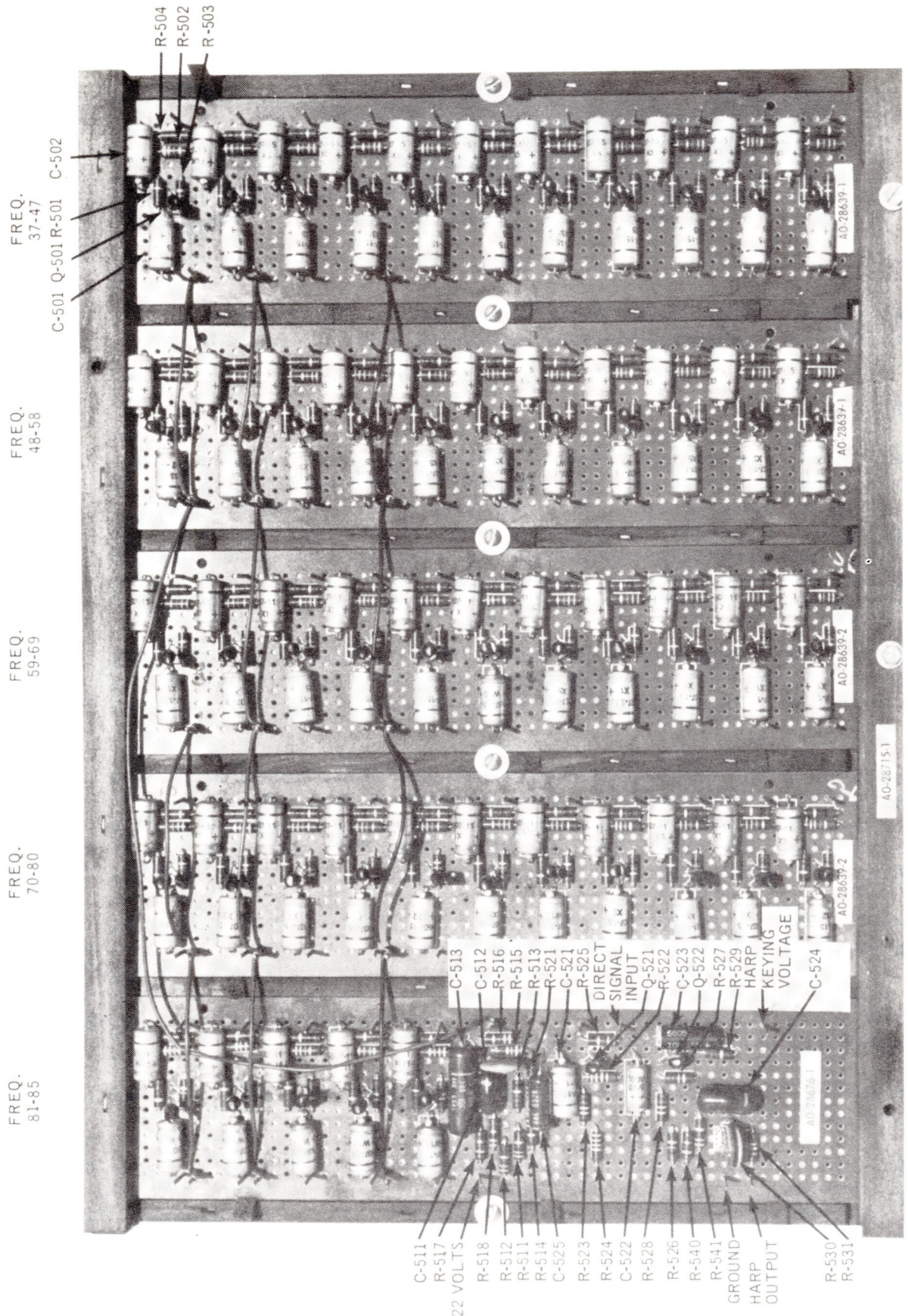


FIGURE 13. HARP SUSTAIN CHASSIS

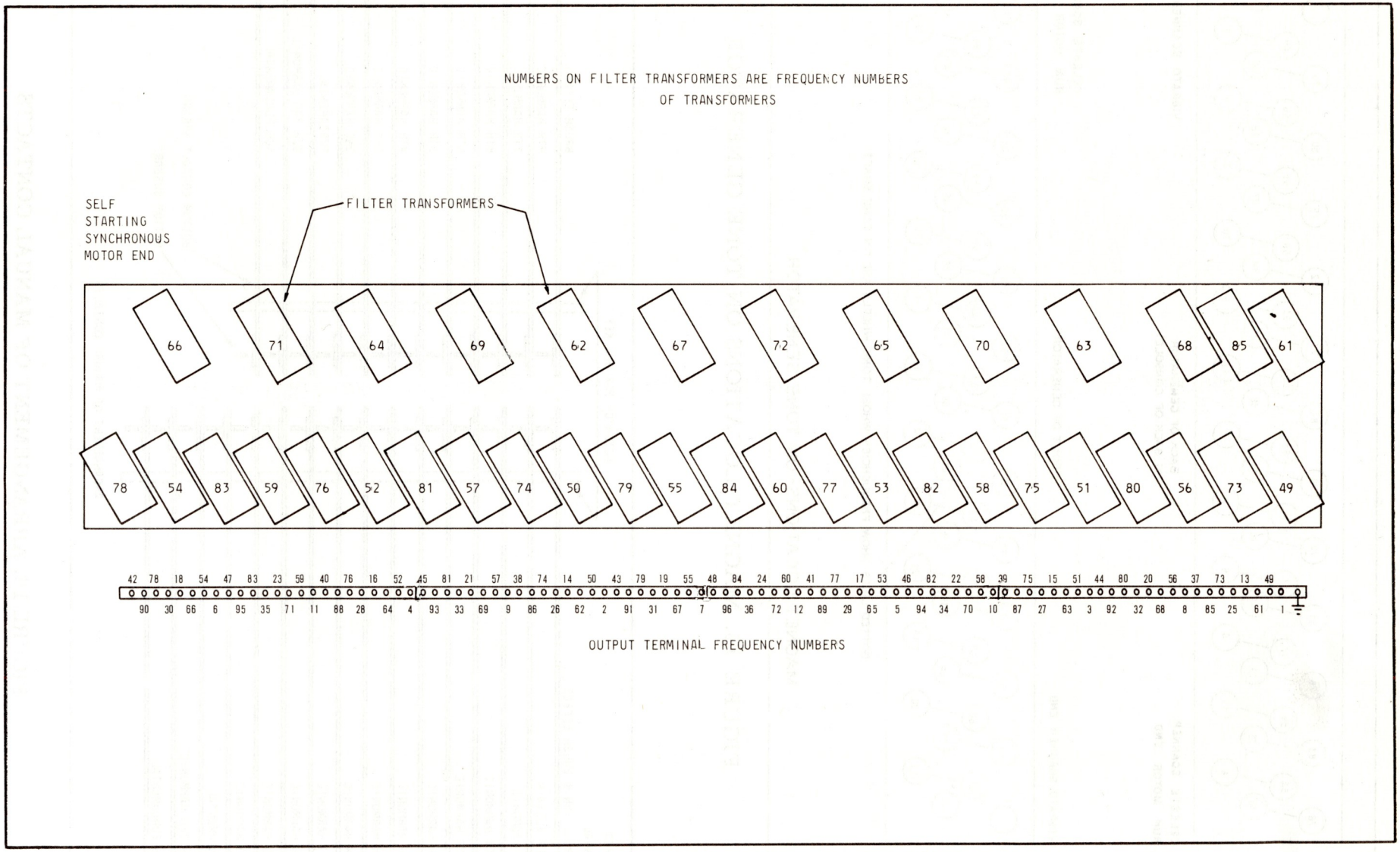


FIGURE 14. MAIN GENERATOR COVER & TERMINAL STRIP

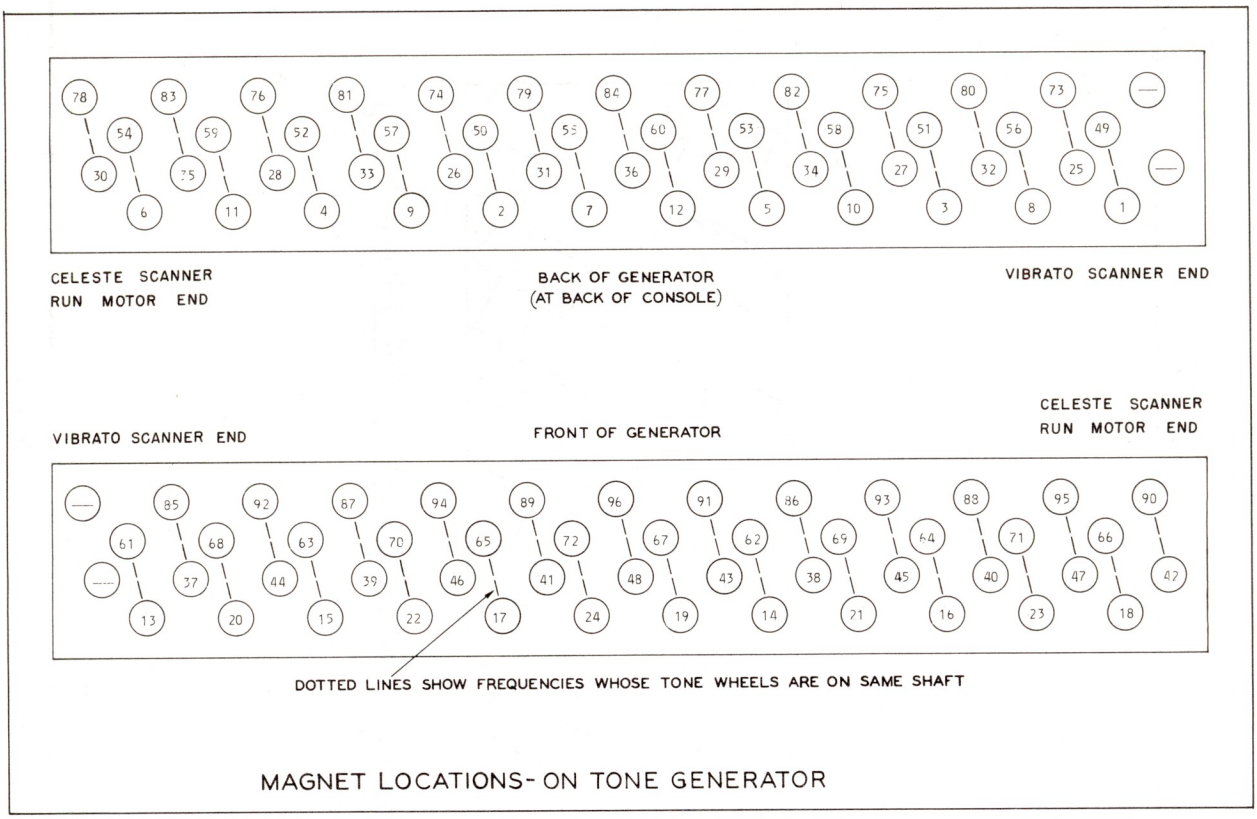


FIGURE 15. MAGNET LOCATIONS ON TONE GENERATOR

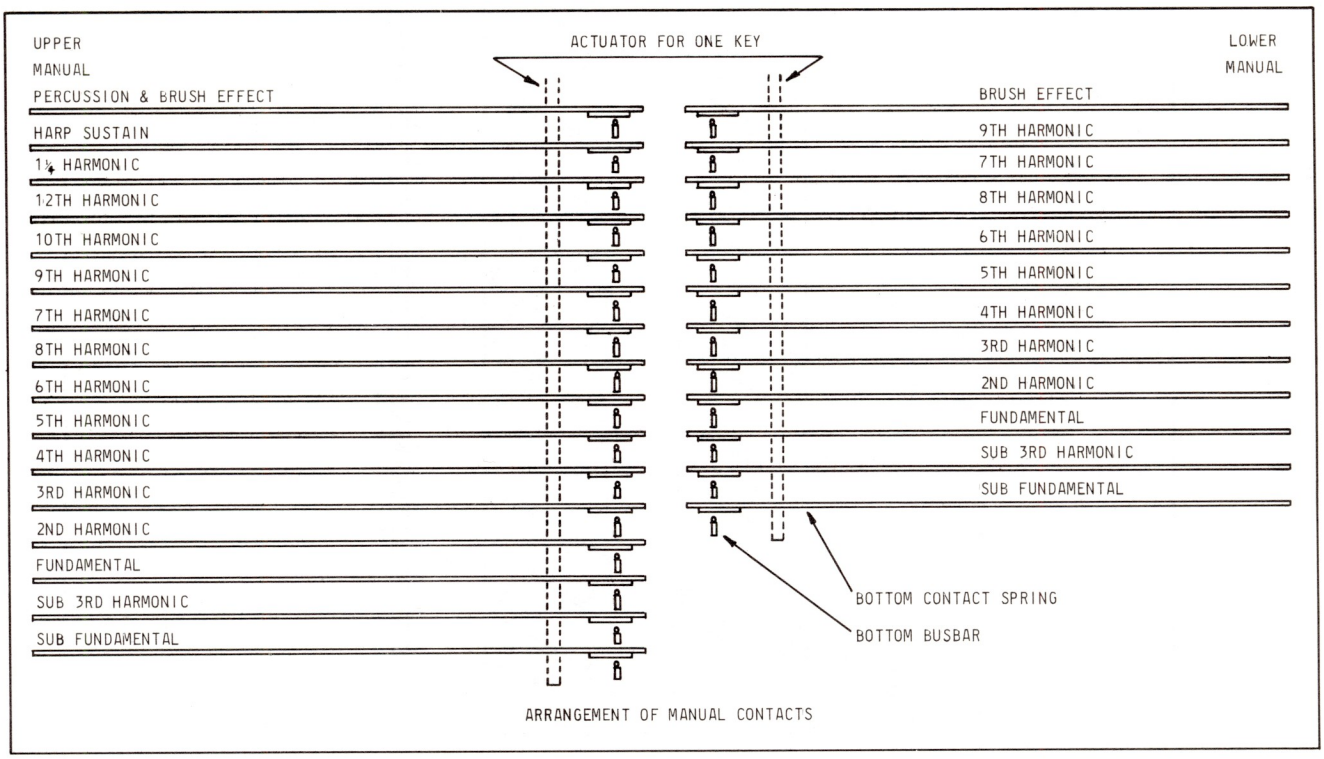


FIGURE 16. ARRANGEMENT OF MANUAL CONTACTS

MANUAL CHASSIS

The manual chassis assembly includes the upper and lower manuals, and preset panel. It has a terminal strip under each manual to accomodate the necessary frequency wires from the tone generator assembly.

UPPER MANUAL

This manual has 61 playing keys, 9 preset keys, and 2 adjust keys, each of which operates 16 small contact springs with precious metal points (see figure 16). When a key is pressed these points make contact with 16 busbars extending the entire length of the manual. The busbars also have precious metal contact surfaces.

When a playing key is depressed, 16 contacts (14 signal and 2 control) make contact with 16 busbars in the manual. The 14 signal contacts are impressed on the 14 signal busbars. Each contact carrying a single harmonic. The 7th and 9th harmonics are combined and fed to a single drawbar by connecting two busbars together inside the manual. The 10th and 12th harmonics are similarly combined.

The 1-1/4 Harmonic is used only in producing the "Chime" effect and is available only when the "B" adjust key is depressed. As there are no wires connected to these busbars, a preset or adjust key must be depressed before any circuit can be completed. Each adjust and preset key has 11 contacts ("B" adjust has 14) exactly like those of the playing keys. When an adjust or preset key is depressed, eleven harmonics are made available at either the recorder panel or the drawbars.

When the "B" adjust key is depressed, in addition to the 11 Harmonics made available at the drawbars, the "Harp" and percussion control contacts are connected to the proper circuits.

These keys have a locking and trip mechanism which locks down one key at a time. The key at the extreme left end of the manual is a cancel key, with no contacts, which releases any preset or adjust key that happens to be depressed.

The percussion control contacts also control the "Brush Upper" circuit. A wire attached to the control busbar connects it to ground through a zener diode D601.

LOWER MANUAL

This manual is identical to the upper manual with the following exceptions. There are 12 contacts; (11 signal and 1 brush keying contact) under each playing key. Each of the signal contacts carries a single harmonic. The 7th & 9th harmonics are carried to one drawbar by connecting two busbars together inside the manual. The remaining contact (brush keying) provides a path to ground each time a key is depressed.

Each adjust and preset key has 10 contacts exactly like those of the playing keys. When an adjust or preset key is depressed 10 harmonics are made available at either the recorder panel or the drawbars.

MANUAL BUSBAR SHIFTERS

The precious metal contact surfaces of the key contacts and busbars are not subject to corrosion, and the manuals are sealed to exclude dust as far as possible. In spite of these precautions an occasional particle of dust may lodge on a contact and cause the note to be scratchy, noisy, or silent, and for this reason a busbar shifting mechanism is provided on each manual to slide the busbars endwise and thus provide a fresh contact surface. The busbar shifter for each manual is a slotted stud near the left end of the manual as viewed from the back of the console (see rear view of console in (figure 2) for location).

Key Number	Note	Drawbar 1 Sub-Fund.	Drawbar 2 Sub-Third	Drawbar 3 Fund.	1⅓ Harm. Upper Manual Chime only	Drawbar 4 2nd Harm.	Drawbar 5 3rd Harm.	Drawbar 6 4th Harm.	Drawbar 7 5th Harm.	Drawbar 8 6th Harm.	Drawbar 9 8th. Harm.	Drawbar 10 7th Harm.	Drawbar 10 9th Harm.	Drawbar 11 10th Harm.	Drawbar 11 12th Harm. Upper Manual only
1	C	1	20	13	17	25	32	37	41	44	49	47	51	53	56
2	C#	2	21	14	18	26	33	38	42	45	50	48	52	54	57
3	D	3	22	15	19	27	34	39	43	46	51	49	53	55	58
4	D#	4	23	16	20	28	35	40	44	47	52	50	54	56	59
5	E	5	24	17	21	29	36	41	45	48	53	51	55	57	60
6	F	6	25	18	22	30	37	42	46	49	54	52	56	58	61
7	F#	7	26	19	23	31	38	43	47	50	55	53	57	59	62
8	G	8	27	20	24	32	39	44	48	51	56	54	58	60	63
9	G#	9	28	21	25	33	40	45	49	52	57	55	59	61	64
10	A	10	29	22	26	34	41	46	50	53	58	56	60	62	65
11	A#	11	30	23	27	35	42	47	51	54	59	57	61	63	66
12	B	12	31	24	28	36	43	48	52	55	60	58	62	64	67
13	C	13	32	25	29	37	44	49	53	56	61	59	63	65	68
14	C#	14	33	26	30	38	45	50	54	57	62	60	64	66	69
15	D	15	34	27	31	39	46	51	55	58	63	61	65	67	70
16	D#	16	35	28	32	40	47	52	56	59	64	62	66	68	71
17	E	17	36	29	33	41	48	53	57	60	65	63	67	69	72
18	F	18	37	30	34	42	49	54	58	61	66	64	68	70	73
19	F#	19	38	31	35	43	50	55	59	62	67	65	69	71	74
20	G	20	39	32	36	44	51	56	60	63	68	66	70	72	75
21	G#	21	40	33	37	45	52	57	61	64	69	67	71	73	76
22	A	22	41	34	38	46	53	58	62	65	70	68	72	74	77
23	A#	23	42	35	39	47	54	59	63	66	71	69	73	75	78
24	B	24	43	36	40	48	55	60	64	67	72	70	74	76	79
25	C	25	44	37	41	49	56	61	65	68	73	71	75	77	80
26	C#	26	45	38	42	50	57	62	66	69	74	72	76	78	81
27	D	27	46	39	43	51	58	63	67	70	75	73	77	79	82
28	D#	28	47	40	44	52	59	64	68	71	76	74	78	80	83
29	E	29	48	41	45	53	60	65	69	72	77	75	79	81	84
30	F	30	49	42	46	54	61	66	70	73	78	76	80	82	85
31	F#	31	50	43	47	55	62	67	71	74	79	77	81	83	86
32	G	32	51	44	48	56	63	68	72	75	80	78	82	84	87
33	G#	33	52	45	49	57	64	69	73	76	81	79	83	85	88
34	A	34	53	46	50	58	65	70	74	77	82	80	84	86	89
35	A#	35	54	47	51	59	66	71	75	78	83	81	85	87	90
36	B	36	55	48	52	60	67	72	76	79	84	82	86	88	91
37	C	37	56	49	53	61	68	73	77	80	85	83	87	89	92
38	C#	38	57	50	54	62	69	74	78	81	86	84	88	90	93
39	D	39	58	51	55	63	70	75	79	82	87	85	89	91	94
40	D#	40	59	52	56	64	71	76	80	83	88	86	90	92	95
41	E	41	60	53	57	65	72	77	81	84	89	87	91	93	96
42	F	42	61	54	58	66	73	78	82	85	90	88	92	94	nc
43	F#	43	62	55	59	67	74	79	83	86	91	89	93	95	nc
44	G	44	63	56	60	68	75	80	84	87	92	90	94	96	nc
45	G#	45	64	57	61	69	76	81	85	88	93	91	95	85	nc
46	A	46	65	58	62	70	77	82	86	89	94	92	96	86	nc
47	A#	47	66	59	63	71	78	83	87	90	95	93	nc	87	nc
48	B	48	67	60	64	72	79	84	88	91	96	94	nc	88	nc
49	C	49	68	61	65	73	80	85	89	92	85	95	nc	89	nc
50	C#	50	69	62	66	74	81	86	90	93	86	96	nc	90	nc
51	D	51	70	63	67	75	82	87	91	94	87	85	nc	91	nc
52	D#	52	71	64	68	76	83	88	92	95	88	86	nc	92	nc
53	E	53	72	65	69	77	84	89	93	96	89	87	nc	93	nc
54	F	54	73	66	70	78	85	90	94	85	90	88	nc	94	nc
55	F#	55	74	67	71	79	86	91	95	86	91	89	nc	95	nc
56	G	56	75	68	72	80	87	92	96	87	92	90	nc	96	nc
57	G#	57	76	69	73	81	88	93	85	88	93	91	nc	85	nc
58	A	58	77	70	74	82	89	94	86	89	94	92	nc	86	nc
59	A#	59	78	71	75	83	90	95	87	90	95	93	nc	87	nc
60	B	60	79	72	76	84	91	96	88	91	96	94	nc	88	nc
61	C	61	80	73	77	85	92	85	89	92	85	95	nc	89	nc
		Frequency Number													

FIGURE 17. MANUAL FREQUENCY CHART

If any note becomes scratchy or silent, it should first be struck 15 or 20 times in a rapid staccato manner to loosen the dirt. This will usually dislodge the particles and clear the note.

In case this procedure is not effective, the busbar shifter for that manual may be adjusted by turning the stud about two turns in either direction. It may sometimes be necessary to actuate the offending key while turning the busbar shifter, in order to wipe the busbar clean.

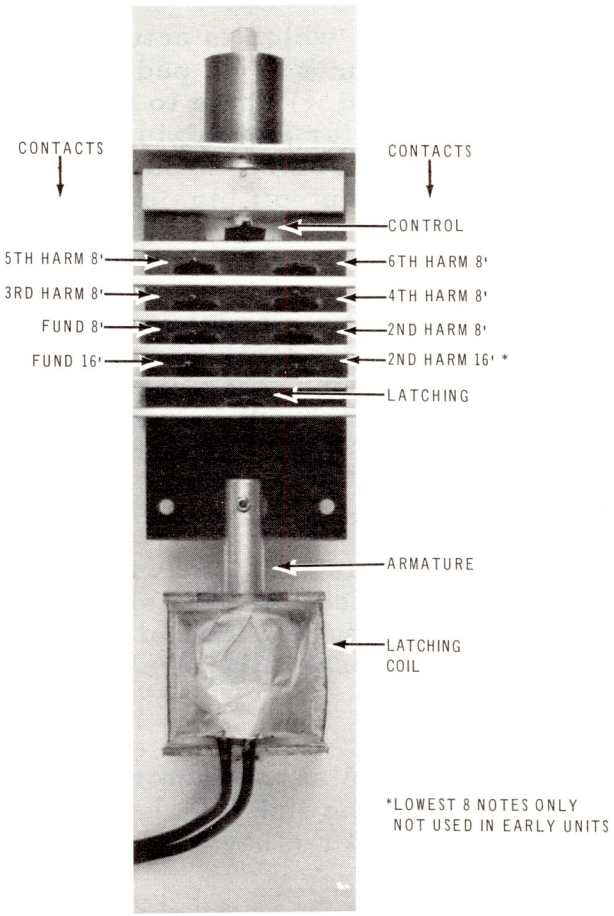


FIGURE 18. ARRANGEMENT OF PEDAL CONTACTS

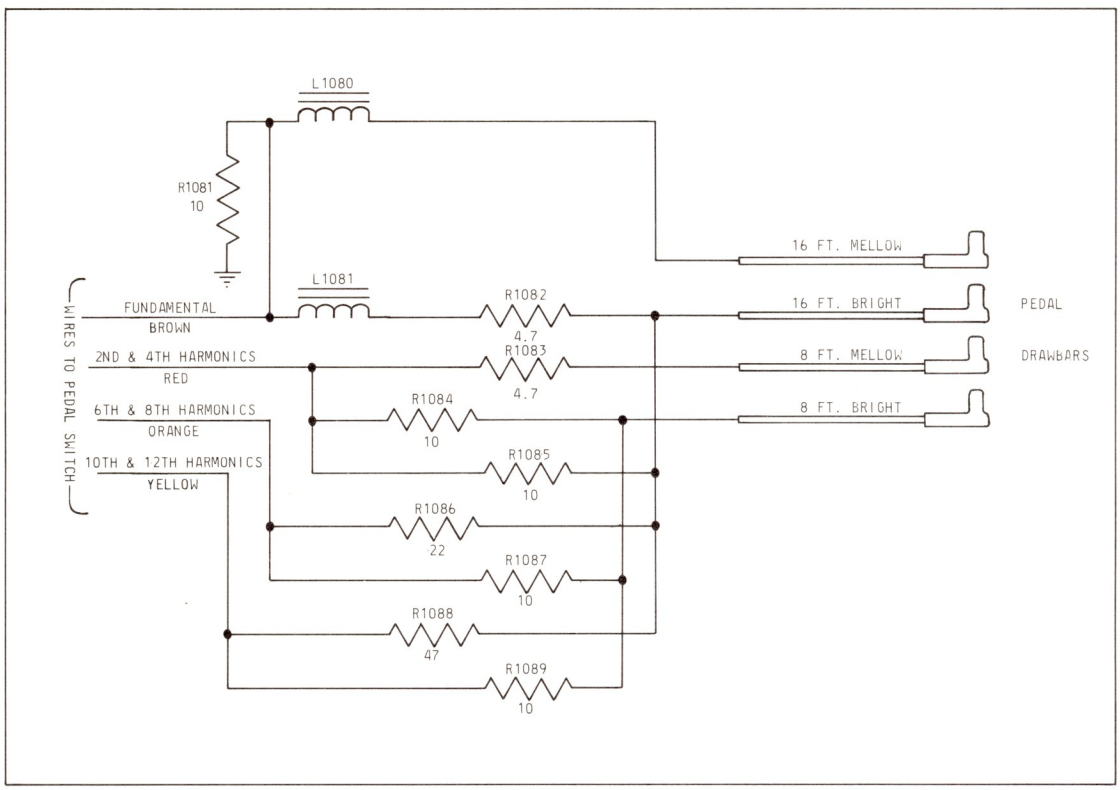


FIGURE 19. PEDAL CIRCUITS

PEDAL SWITCH

The pedal switch, which is actuated by the pedal keyboard, consists of 25 groups of 9 contacts each. When a pedal is depressed, 9 contacts (7 signal, 1 control or keying and 1 latching) make to 6 busbars (figure 18). The 4 signal busbars are routed through filter and mixing networks to the pedal drawbars. The signals from the drawbars are routed through the pedal percussion preamplifier. The control contact removes cut-off bias on the pedal control tube V-101, letting the pedal sound.

The latching contact comes into play when one or both "String Bass" tabs are depressed. Everytime a pedal is depressed this latching contact closes and provides a ground path for its latching solenoid. When the solenoid is energized it holds closed 8 contacts until the next pedal is played at which time it releases and the next pedal latches. In all instances, the control or keying contact is made only as long as a pedal is depressed; that is this contact does not latch.

Pedal Switch Busbar Shifters

The pedal switch is equipped with busbar shifters similar to those on the manuals. The pedal busbar shifter is a slotted stud on the near surface of the pedal switch, near the left end as you look in at the back. It should be adjusted as described under "Manual Busbar Shifters" on a previous page.

Pedal Keyboard

Pedal keys are set at the factory for average tension, but are adjusted to fit the requirements of the individual organist. Adjustment is accomplished by removal of the top cover at the back of the pedal keyboard and setting the tension as desired.

PEDAL SECTION

The signals from the pedal drawbars are blended and fed to the primary of T-101. The signal in the primary of T-101 are converted to push-pull in the secondary and fed to the grids of V-101, pedal control tube. Anytime a pedal is depressed, it's keying contact applies a positive 6 volt potential to the grids of V-101 causing it to conduct, thereby permitting the signal to pass.

The 6 volt keying voltage reaches the grids through diode D-101 and R-104 this keying voltage now charges C-102. When the pedal is released, the charge on C-102 discharges through R-104 and R-105 to ground.

STRING BASS

When either of the "String Bass" tablets are depressed, a latching action will take place whenever a pedal is depressed. The signal contacts will remain closed and a sustained signal will be fed to the drawbars and on through T-101 to the grids of V-101. The keying contact does not remain closed, however. The positive voltage, which turns V-101 on, feeds through diode D-101 and R-104, charging C-102, located in the secondary center tap of T-101. The pedal sustain time is controlled by the amount of time it takes C-102 to discharge through R-1010 and/or R-1011. These two resistors are located in the circuit of the "String Bass" tablets.

From the plates of V-101, the signal is fed to the grids of V-102 where the pedal signal is amplified. From V-102, the signal is fed to the grids of V-103. This tube converts the push-pull signal to a single ended output. The signal is taken off between the plate of V-103B and the cathode of V-103A and fed to the pedal level control. From here, the pedal signal is mixed with the signal from the lower manual and fed to the "ON-LOWER" vibrato switch.

Pedal No.	Note	Fund 16'	SEE NOTE 2nd Harm 16'	Fund 8'	2nd Harm 8'	3rd Harm 8'	4th Harm 8'	5th Harm 8'	6th Harm 8'
1	C	1	13	13	25	32	37	41	44
2	C#	2	14	14	26	33	38	42	45
3	D	3	15	15	27	34	39	43	46
4	D#	4	16	16	28	35	40	44	47
5	E,	5	17	17	29	36	41	45	48
6	F	6	18	18	30	37	42	46	49
7	F#	7	19	19	31	38	43	47	50
8	G	8	20	20	32	39	44	48	51
9	G#	9		21	33	40	45	49	52
10	A	10		22	34	41	46	50	53
11	A#	11		23	35	42	47	51	54
12	B	12		24	36	43	48	52	55
13	C	13	No Connection	25	37	44	49	53	56
14	C#	14		26	38	45	50	54	57
15	D	15		27	39	46	51	55	58
16	D#	16		28	40	47	52	56	59
17	E	17		29	41	48	53	57	60
18	F	18		30	42	49	54	58	61
19	F#	19		31	43	50	55	59	62
20	G	20		32	44	51	56	60	63
21	G#	21		33	45	52	57	61	64
22	A	22		34	46	53	58	62	65
23	A#	23		35	47	54	59	63	66
24	B	24		36	48	55	60	64	67
25	C	25		37	49	56	61	65	68
		Frequency Number							

FREQUENCIES USED IN PEDAL SWITCH

FIGURE 20.

NOTE: These frequencies omitted on early series instruments

PEDAL LATCHING SYSTEM

The latching and release system used in this organ is of the constant current type, and is entirely electronic in nature. Its operation and adjustment is as follows.

The Pedal latching power supply is a full wave type utilizing a winding of the power transformer T-701, and diodes D701 and D-702. The open circuit voltage of this supply (marked +30V) is approximately 32 volts. A portion of this supply is used to power the transistor preamplifiers and the brush and cymbal boards. The pedal latching supply uses two transistors. Q-701 is a control transistor, while Q-702 is a series current regulator.

THEORY OF OPERATION

With the string bass tabs up, no voltage drop will appear across R-712, R-713, R-714, or Zener diode D-704. Because no voltage drop takes place across this

resistor string, the base of Q-702 will be at the same potential as its emitter. When a "String Bass" tab is depressed, the low end of R-714 is routed to ground and the supply voltage less the Zener voltage (6 volts) is impressed across R-714. This means that approximately 25 volts will appear across R-714, while the Zener voltage, less the supply voltage, will appear across R-712, R-713, and between the emitter and collector of Q-701. Approximately 2-1/2 volts of this zener voltage will appear across R-712. With a pedal pressed, R-712 (the 30 volt adjust potentiometer is adjusted so that 125 ma, of current is drawn by one of the pedal latching coils. To measure this it will be necessary to open the pedal supply line, pin 6 of P-702, and insert a milliammeter. In practice, it has been shown that when a 125 ma, is drawn, the voltage across the coil is approximately 18 volts. Once a pedal is latched down, it will remain so until another pedal is depressed. When this occurs a voltage drop will take place, at the collector of Q-702 which shows up across C-708. This drop (negative pulse) is reflected back through diode D-705 to the base of Q-701. Q-701 will now conduct and short out zener diode D-704 so that the full supply voltage momentarily appears across resistor R-714. When this happens, no drop will take place across resistors R-712 and R-713 so that the base voltage of Q-702 is now the same as its emitter.

Under this condition no voltage will appear at the output of the latching supply. All this occurs very rapidly. With the supply momentarily off, the coil previously latched will be released, and when the supply is re-established, the pedal now depressed will be latched down. This pedal will remain latched until the next pedal is depressed, in which case the entire release and latch cycle is repeated. Diode D-707 is a protective device so that the collector of Q-702 can never exceed its base voltage, while diode D-706 passes any positive pulses from the latching supply back into the supply itself.

NOTE:

Because the "string bass" tabs introduce a "sustain" or "automatic pedal legato" mode in which a pedal note fades away after the pedal is released, it is necessary to have the signal contacts of the last-played pedal remain closed. This is accomplished by a solenoid under each pedal which is electrically held down through a locking contact.

The power supply to the pedal latching solenoids is marked + 30 V. for identification but is actually a constant current circuit which can furnish only enough current to hold down one solenoid. When a second pedal is pressed, there is not enough current to energize both solenoids, so the first one releases. The solenoid under the pedal which is pressed then locks down.

To insure greatest reliability in operation, a transistor circuit is provided to disable the constant current supply momentarily and insure that the first solenoid releases. Note, however, that this feature does not function in case a pedal is played before the previous one is released. The pedals are expected to operate satisfactorily when so played, but a more precise adjustment of the "+ 30 V. adjustment" may be required.

AMPLIFYING SYSTEM

The amplifying system of this organ is made up of ten individual units. Eight of these units are printed wiring boards, each containing the transistors and necessary components for its particular function. The remaining two units are tube type units; The one located on the rear of the control panel assembly contains the manual percussion and pedal control tubes with their associated amplifiers. The

large chassis on the lower shelf is the console power output amplifier. Also located on the bottom shelf of the organ is the organ power supply.

With the two shield covers removed from the printed wiring boards and looking at these boards from left to right from the rear of the organ, these boards perform the following functions; Second Celeste Amplifier, Common Celeste Amplifier, Celeste Drive Amplifier, Non-vibrato Preamplifier, Vibrato Drive Amplifier, Chorus Drive Amplifier, Common Vibrato Amplifier, and Second Vibrato Amplifier.

These printed wiring boards are held in position by clips on the rear of the control panel and are easily replaced.

The signal from the lower manual matching transformer is mixed with the pedal signal and routed to the "On-Lower" vibrato tablet. The signal from the upper manual is routed to the "On Upper" vibrato tablet. Depending upon the position of the vibrato tablets, the signal from the manual and pedals may be routed either into the vibrato or the non-vibrato channel of the amplifying system.

The output of the percussion amplifier is mixed with the output of the Harp preamplifier and these two signals are combined and routed to the "Add Vibrato" tablet in the percussion group. In this case, the percussion signals are likewise routed either into the vibrato or non-vibrato channel of the amplifying system.

VIBRATO SYSTEM

COMMON VIBRATO, SECOND VIBRATO, COMMON CELESTE AND SECOND CELESTE AMPLIFIERS.

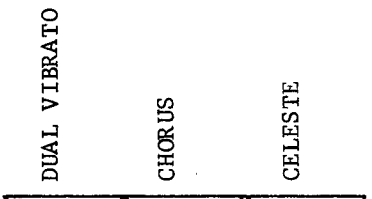
In the case of each of these amplifiers, the signal picked up by the scanner is capacity coupled to the base of Q807, which is direct-coupled to the base of Q808. The signal is taken from the emitter of Q808 and fed to the base of Q809. The collector output of Q-809 is now capacity coupled to the vibrato variation switches.

SIGNAL ROUTING THROUGH VIBRATO VARIATION SWITCHES

When these three variation switches, "Dual Vibrato", "Chorus" and "Celeste", are in the "Up" position, the signal from the common vibrato amplifier is fed into both the "A" and the "B" channels of the amplifying system. This gives the same vibrato effect on both channels. With the "Dual Vibrato" tablet depressed, the common vibrato amplifier signal now feeds into the "A" channel, while the second vibrato amplifier signal is routed into the "B" channel of the amplifying system. The common Vibrato Amplifier also feeds a signal to the base of Q-810, the Celeste Drive Amplifier. When the "Celeste" tab is depressed, the signal from the output of the common celeste amplifier is routed into the "B" signal channel, while the output of the second celeste amplifier is routed into the "A" signal channel. To provide a dual celeste effect, with this setting, vibrato tabs I and II have no effect.

With the "Dual Vibrato" and "Celeste" tabs up and the Chorus tablet depressed, the common vibrato amplifier signal is fed into the "A" signal channel, while the output of the chorus drive amplifier Q-810 is fed into the "B" signal channel. After the vibrato variations switches, the brush and cymbal signal is fed into the "B" signal channel. Both the "A" and "B" signal channels are mixed with the non-vibrato signal channel, and are routed to the expression pedal. The expression pedal now shunts more or less of each of these channels to ground, depending on it's setting. The remaining signal of both, the "A" and "B" channels is now fed through a resistor and condensor network to the "Volume Soft" tablet. For a pictorial breakdown of the above effects refer to figure 21.

H-100 ANIMATION TABS



EFFECT	AFFECTED BY VIB I AND VIB II TABS
Single phase vibrato in both speakers.	YES
Single phase vibrato in 1 speaker; opposite phase vibrato in other speaker.	YES
Same as above except vibrato line is mismatched.	YES
Single vibrato in 1 speaker and non-vibrato in other speaker.	YES
Single (slow scan) celeste in 1 speaker and opposite phase celeste in other speaker.	NO
Same dual celeste as above except previously treated with single phase vibrato.	YES
Same as above (single vibrato-dual celeste) with mis-matched vibrato line.	YES
Single phase vibrato in 1 speaker and single phase celeste in other speaker.	YES

FIGURE 21.

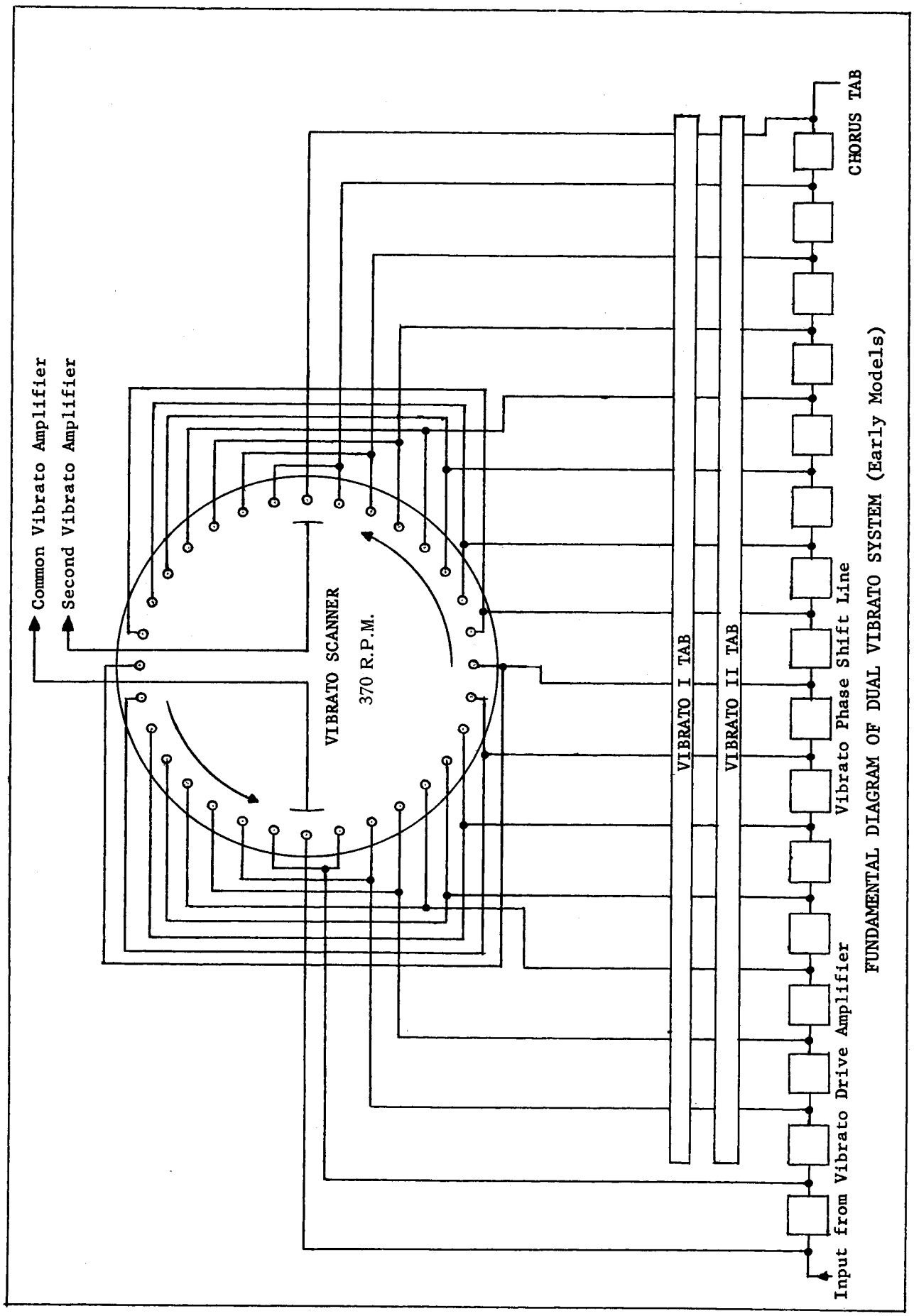

Common Vibrato Amplifier
Second Vibrato Amplifier
VIBRATO SCANNER
370 R.P.M.
VIBRATO I TAB
VIBRATO II TAB
CHORUS TAB
Vibrato Phase Shift Line
Input from Vibrato Drive Amplifier
FUNDAMENTAL DIAGRAM OF DUAL VIBRATO SYSTEM (Early Models)

FIGURE 22.

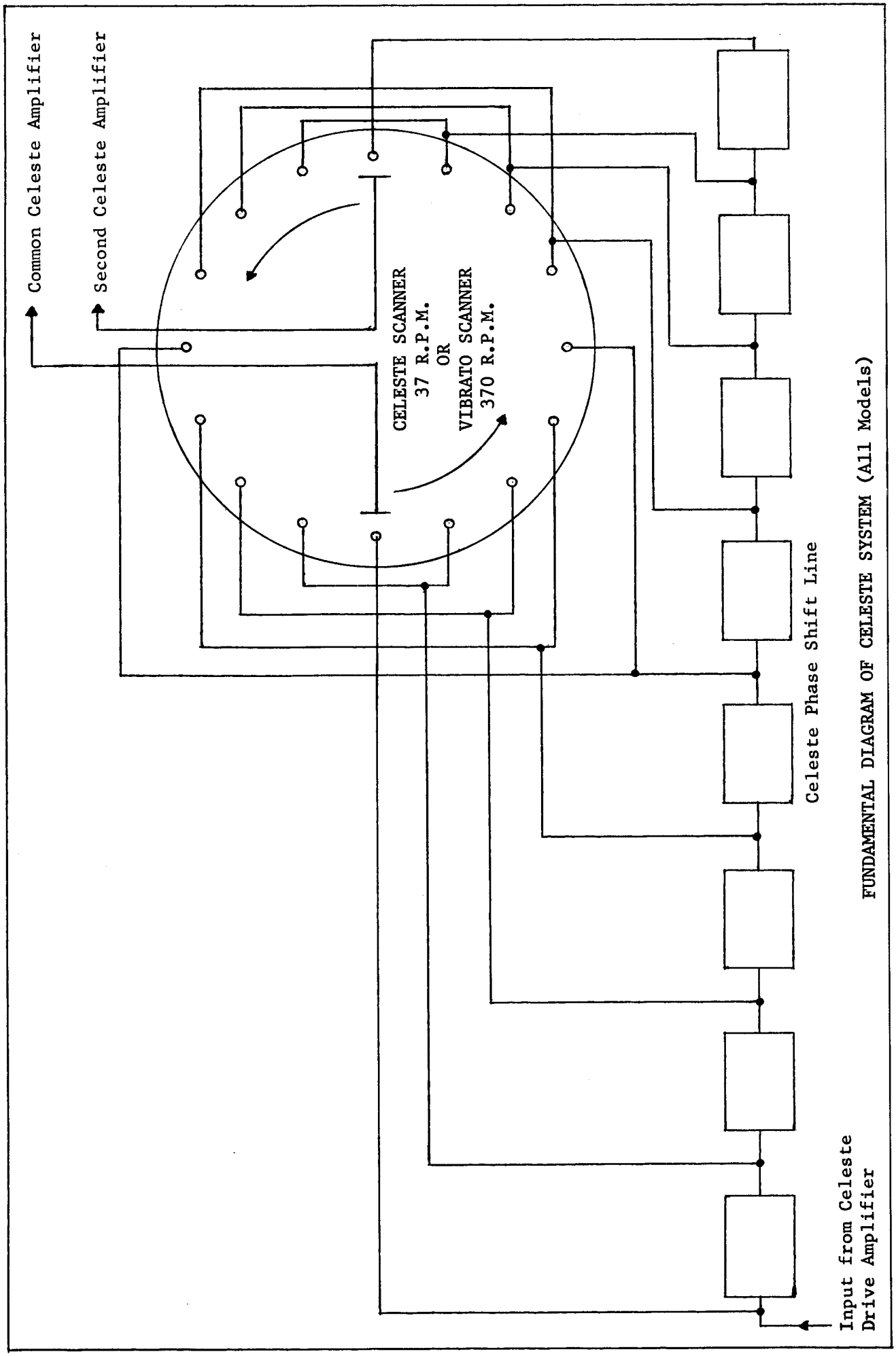


FIGURE 23. FUNDAMENTAL DIAGRAM OF VIBRATO SYSTEM
SERIAL NO. 15000 AND UP

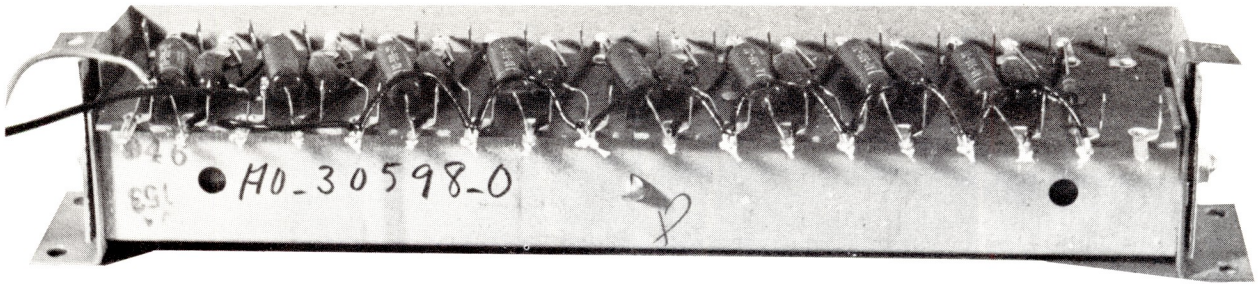


FIGURE 24. TYPICAL VIBRATO LINE BOX

NON-VIBRATO PREAMPLIFIER

Signals entering the non-vibrato channel of the amplifying system are capacity coupled to the base of Q-801. The output of Q801 is then capacity coupled to the base Q-802. The output of Q-802 is divided and forms a portion of both the "A" and "B" signal channels.

VIBRATO PREAMPLIFIER

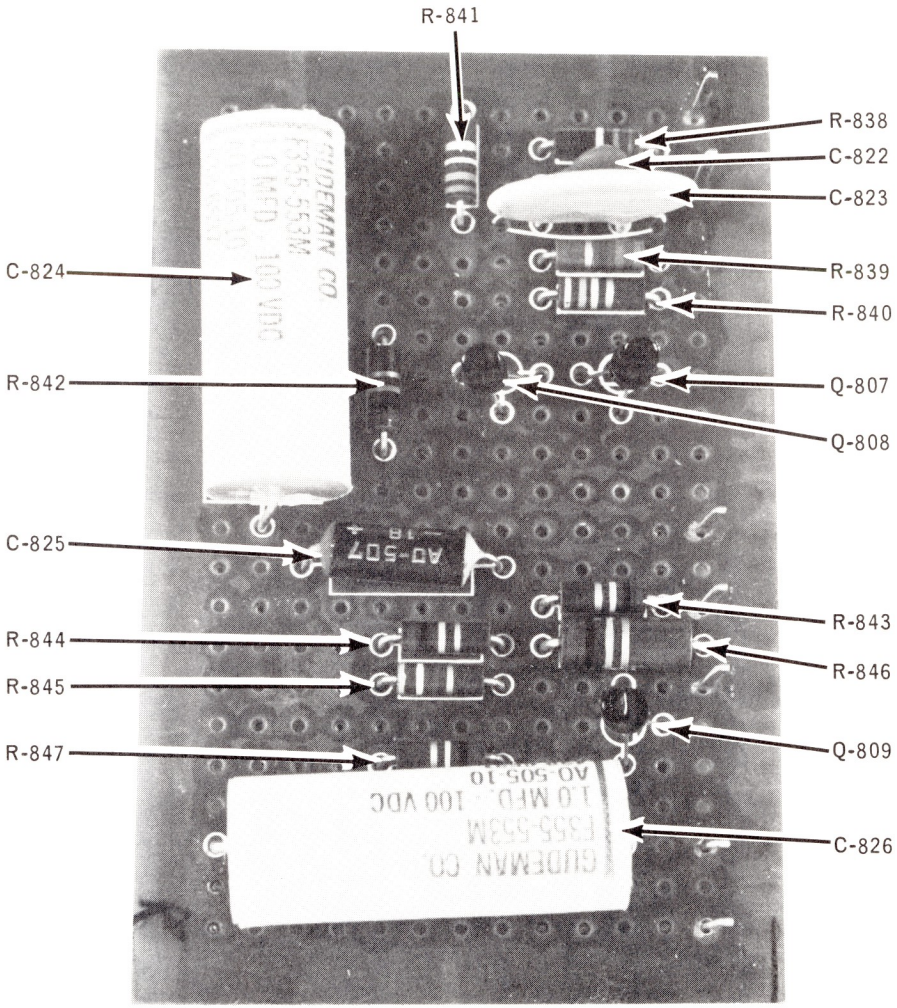
Signals entering the vibrato channel of the amplifying system are capacity coupled to the base of Q-804, which is direct coupled to the base of Q-805. The collector of Q-805 is capacity coupled to the base of Q-806. This signal is used for driving the line box assemblies. A portion of this signal is fed to the base of Q-810, chorus drive amplifier.

CHORUS AND CELESTE DRIVE AMPLIFIER

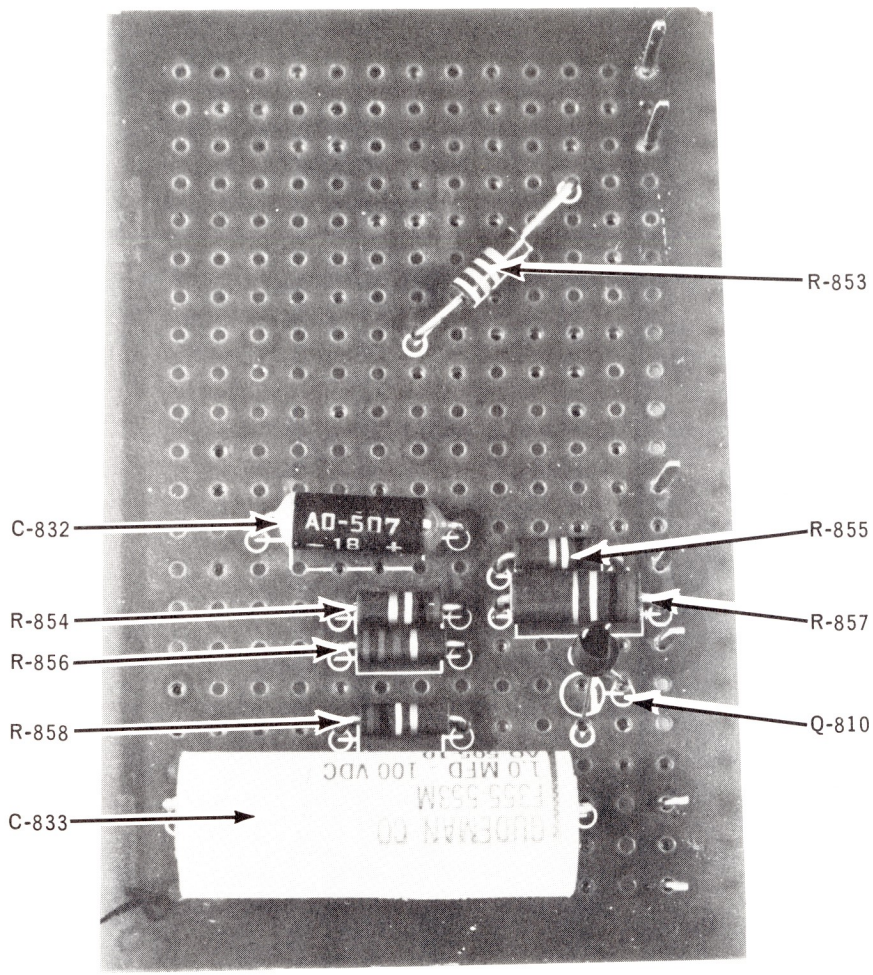
The signal amplified by Q810 is taken from the collector and routed to the "Chorus" and "Dual Vibrato" switches. When the "Chorus" and "Dual Vibrato" tabs are in the Up position, the signal from the chorus drive amplifier is fed through R-1050 to the base of Q-810 the celeste drive amplifier. With the "Chorus" tab depressed, this signal is routed into the "B" signal channel. When the "Dual Vibrato" tab is depressed, the signal line to the celeste drive amplifier is removed from the chorus drive amplifier and is now taken from the common vibrato amplifier.

The celeste drive amplifier amplifies the signal which is capacity coupled from the collector and is used to drive the celeste phase shift line.

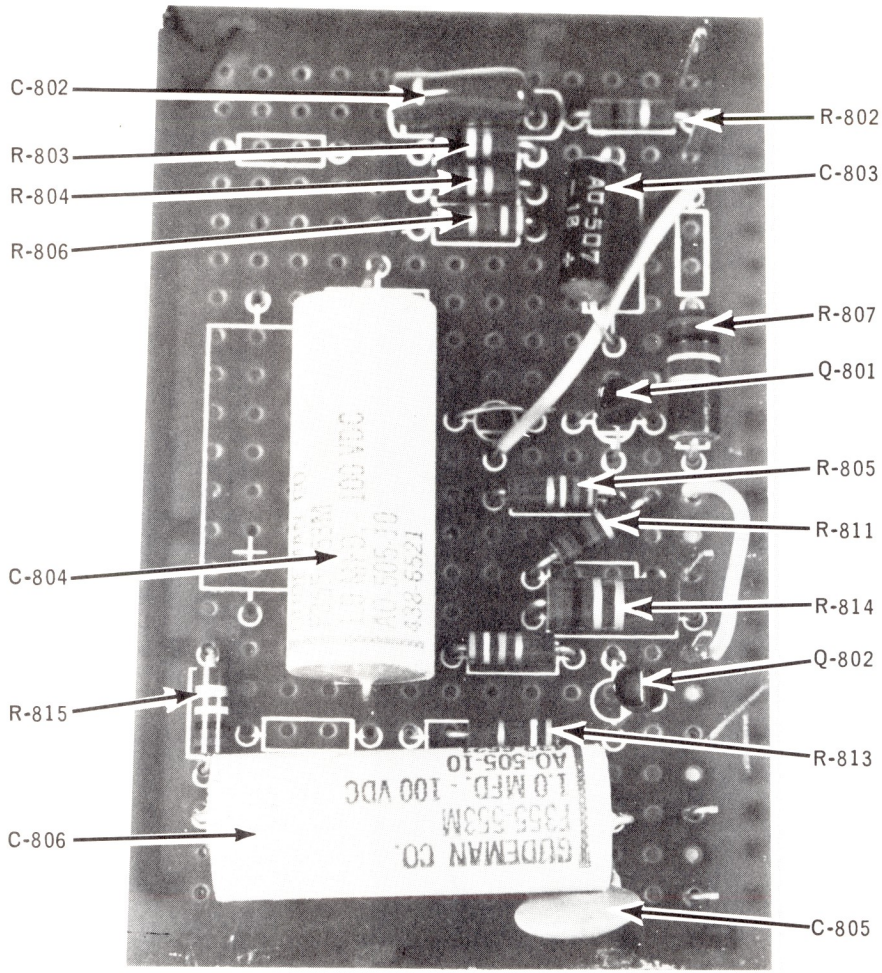
NOTE: The circuits of the common vibrato, second vibrato, common celeste and second celeste amplifiers are identical, except for slight variations at the inputs, with respect to the type of coupling used. Also, it will be helpful to know that the above four amplifiers share common component designation numbers.



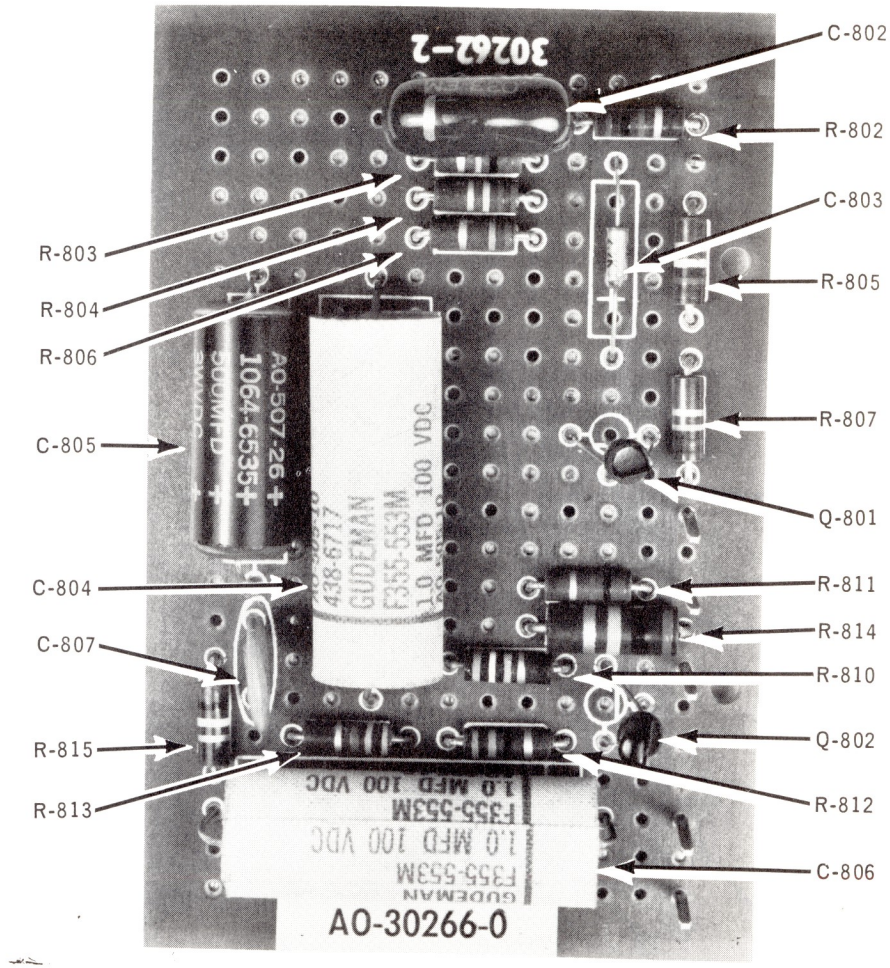
COMMON VIBRATO, SECOND VIBRATO
COMMON CELESTE, SECOND CELESTE
AMPLIFIER BOARDS
124-000074 (CELESTE)
124-000075 (VIBRATO)
SCHEMATIC FIGURES 40 & 41
FIGURE 25



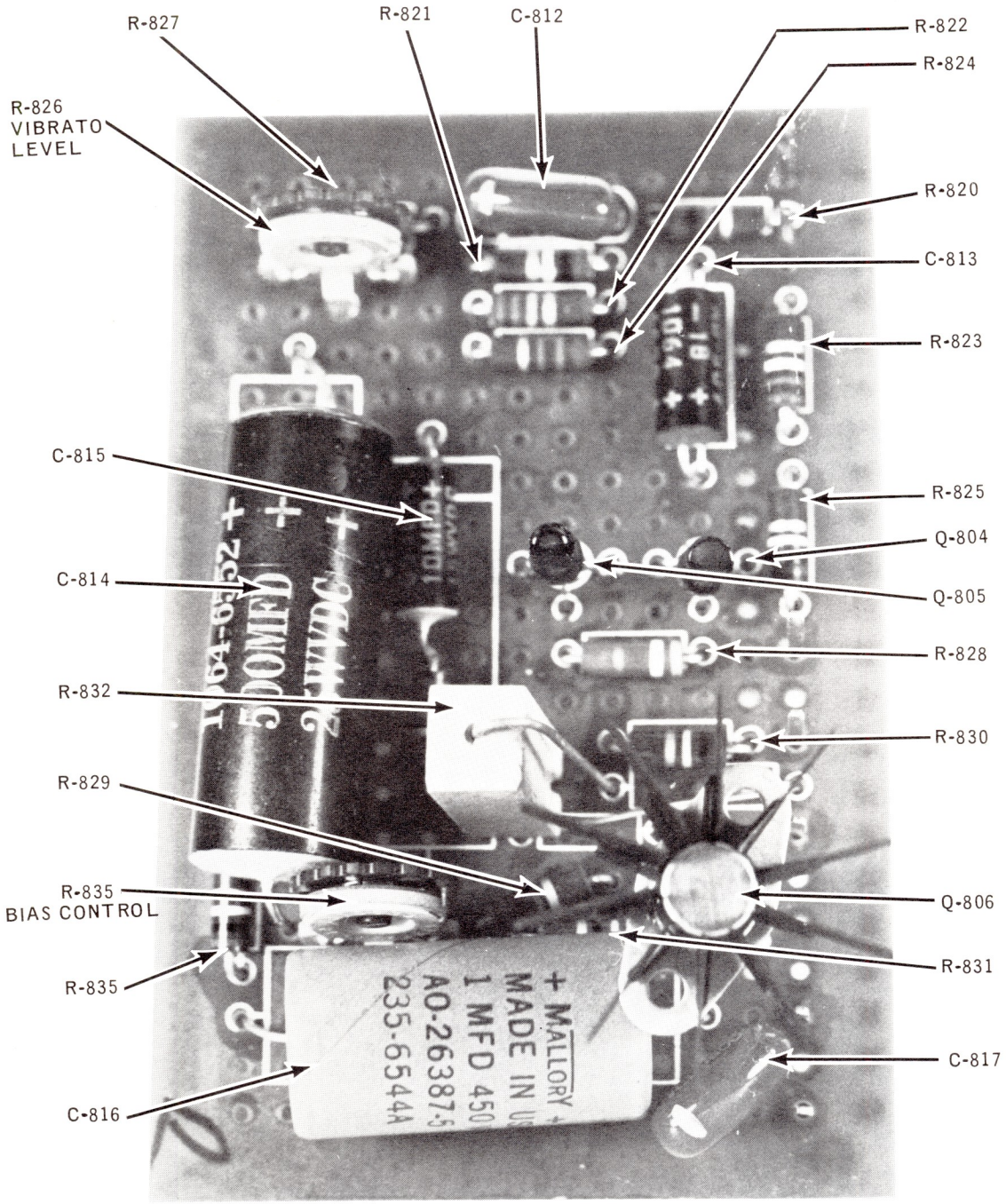
CELESTE DRIVE AMPLIFIER BOARD
124-000077
SCHEMATIC FIGURES 40 & 41
FIGURE 26



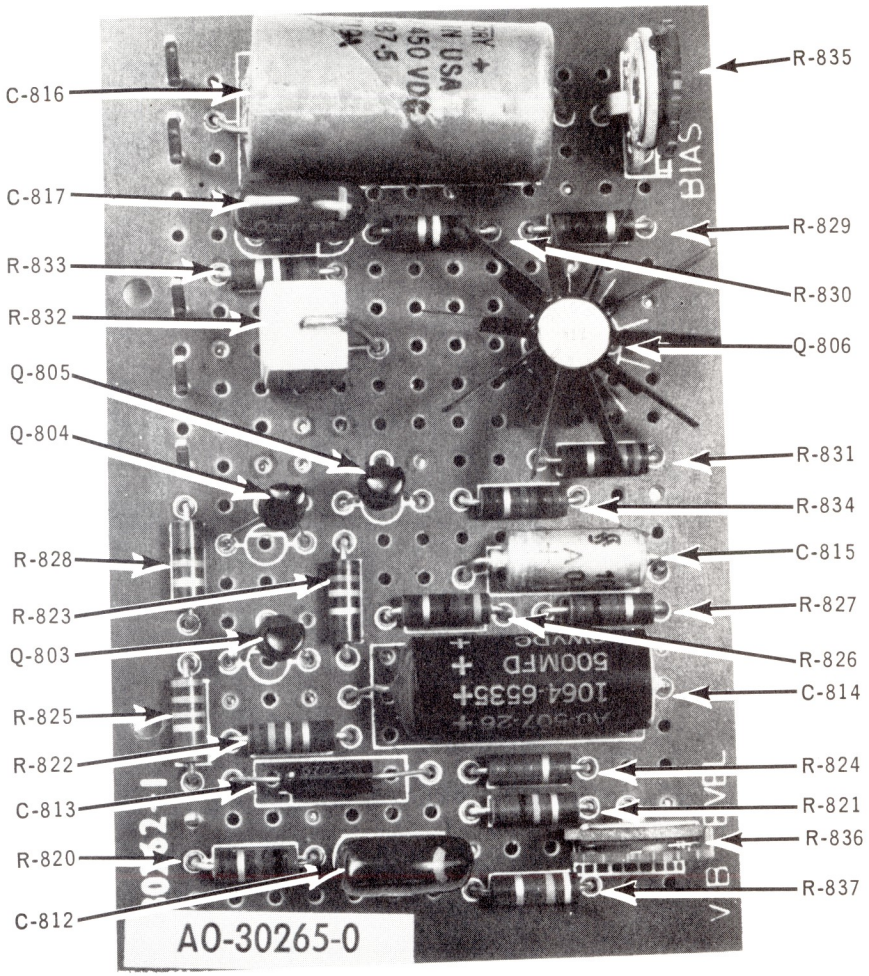
NON-VIBRATO DRIVE AMPLIFIER
124-000073
SCHEMATIC FIGURE 40
FIGURE 27



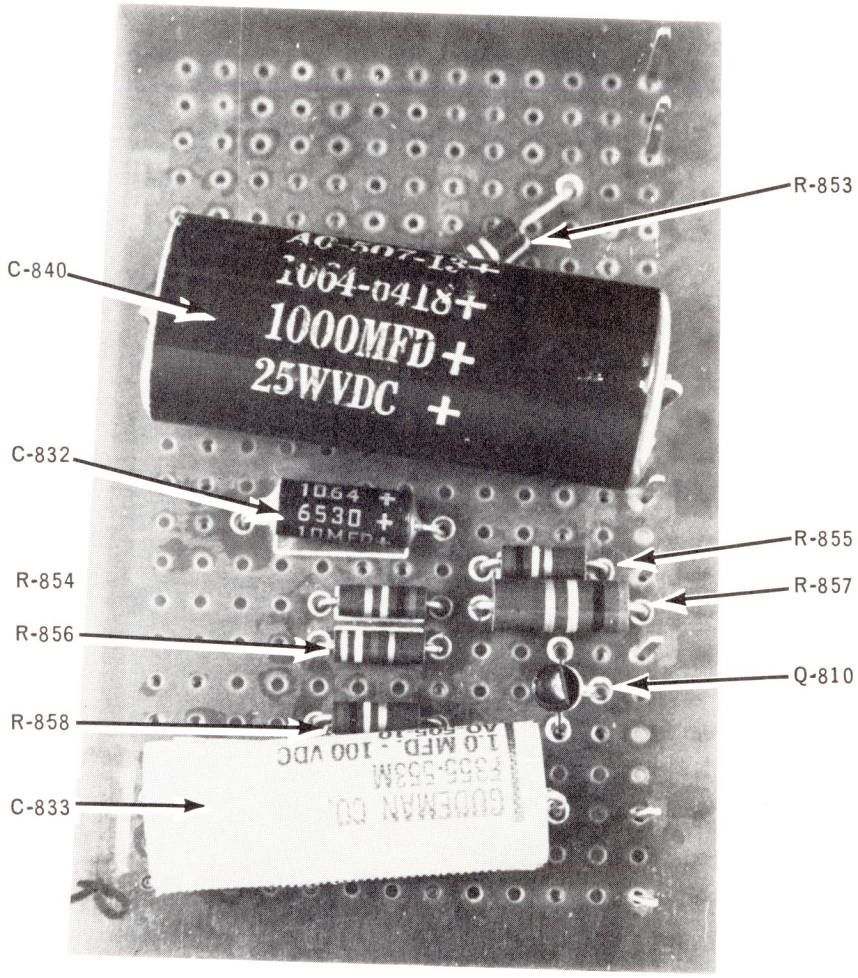
NON-VIBRATO DRIVE AMPLIFIER
(LATER UNITS)
124-000073
SCHEMATIC FIGURE 41
FIGURE 28



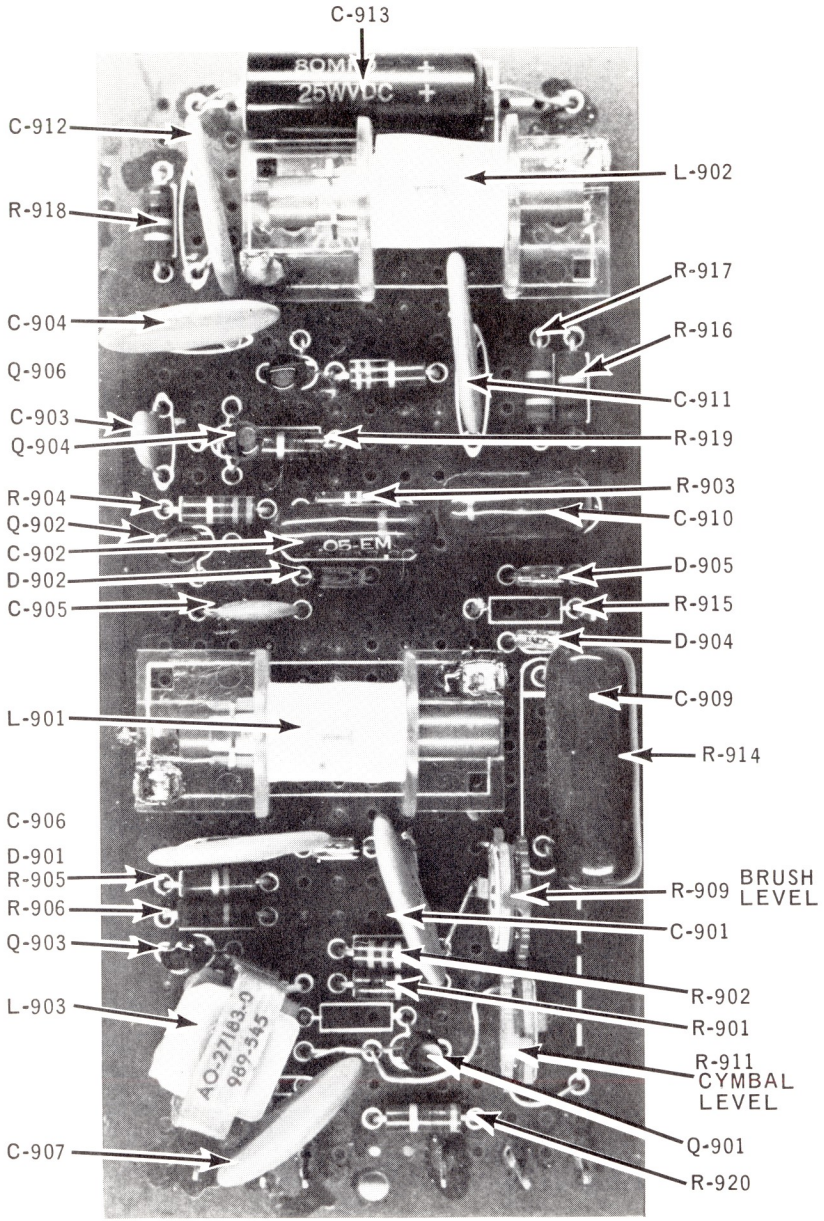
VIBRATO DRIVE AMPLIFIER
124-000072
SCHEMATIC FIGURE 40
FIGURE 29



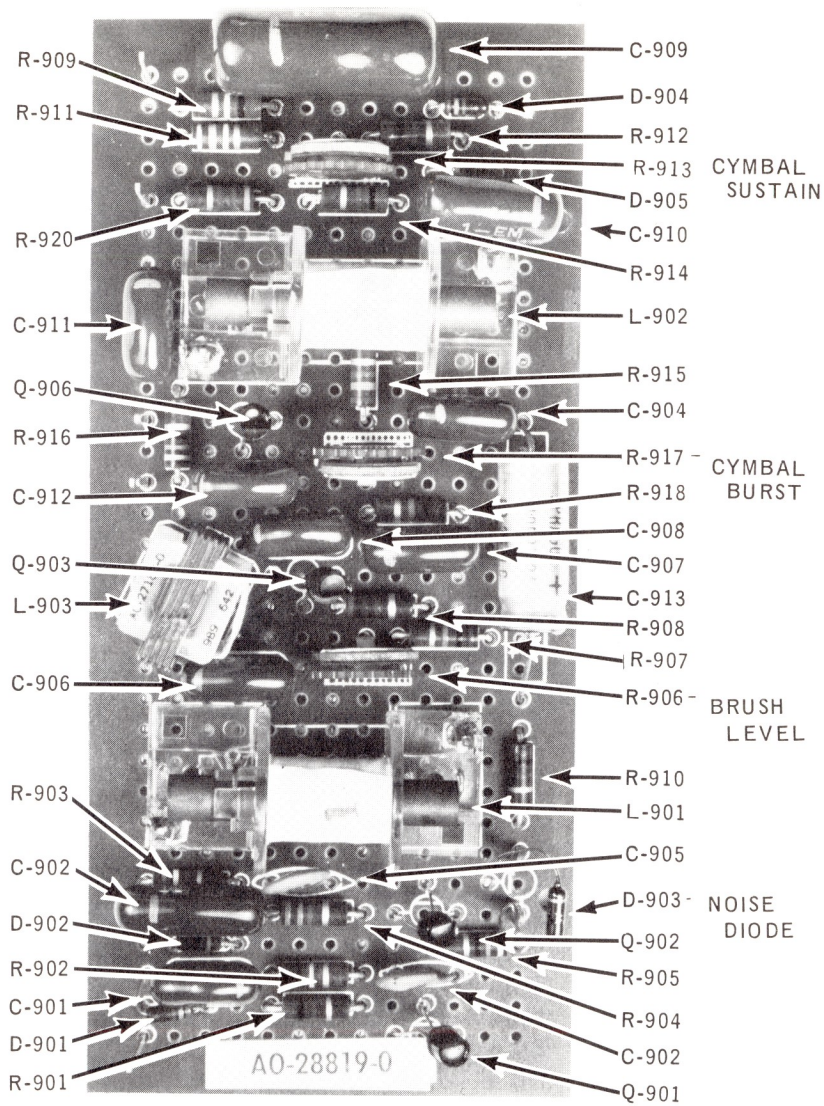
VIBRATO DRIVE AMPLIFIER (LATER UNITS)
124-000072
SCHEMATIC FIGURE 41
FIGURE 30



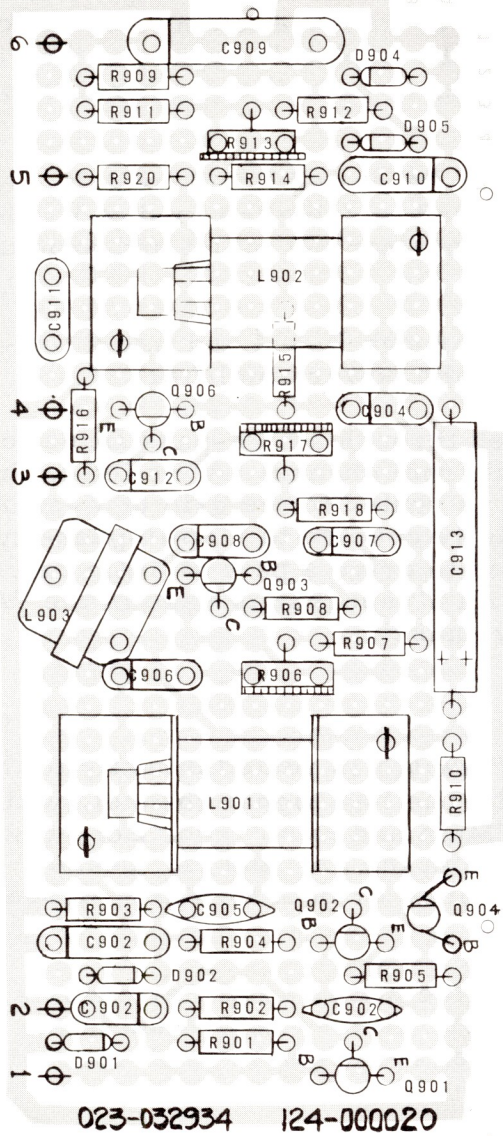
CHORUS DRIVE AMPLIFIER (LATER UNITS)
124-000076
SCHEMATIC FIGURE 54
FIGURE 31



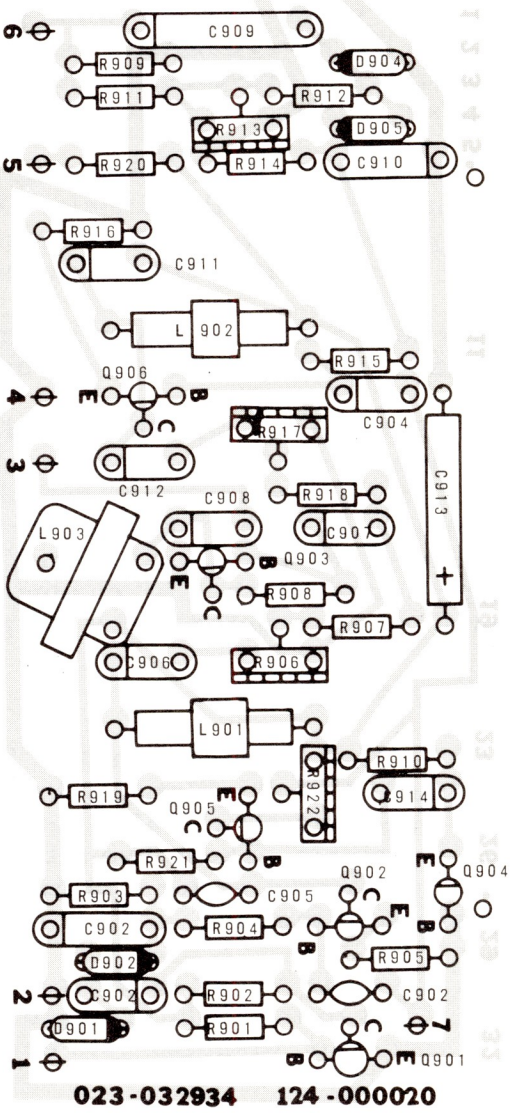
BRUSH/CYMBAL GENERATOR
124-000020
SCHEMATIC FIGURE 40
FIGURE 32



BRUSH/CYMBAL GENERATOR
(LATER UNITS)
124-000020
SCHEMATIC FIGURE 41
FIGURE 32A



BRUSH/CYMBAL GENERATOR
124-000020
EARLY 1969 TYPE
SCHEMATIC FIGURE 64
FIGURE 32B



BRUSH/CYMBAL GENERATOR
124-000020
LATE 1969 TYPE
SCHEMATIC FIGURE 64
FIGURE 32C

"A" CHANNEL AND REVERBERATION

The "A" channel signal from the "Volume Soft" switch is routed to the grid of V-301A and to the grid of V-303B. The signal which arrives at V-301A is amplified and capacity coupled to the grid of V-301B, and the output of this tube is capacity coupled to the driver coil of the reverberation unit. After the signal has been delayed, the reverberated signal is fed to the grid of V-302, where it is amplified and then capacity coupled to the top of the reverberation level control. The signal from this control is fed to the grid of V-303A. The reverberated signal is now taken from the cathode of V-303A and fed to the reverberation switches. The signal, which was fed to the grid of V-303B, is likewise taken from the cathode and fed to the reverberation switches. This signal completely bypasses the reverberation unit and provides the non-reverberated signal path when both reverberation switches are in the "Up" position.

The "A" channel signal, when routed through the "Main and Echo" switch, is divided into three signal channels. One signal is used to drive the grid of V-304A. The output of V-304A is capacity coupled to the tone cabinet outlet and provides the "A" channel drive signal for the tone cabinet.

Another leg of the "A" channel signal is routed through R-404 and into a low-pass filter and forms a portion of the bass channel of the power amplifier.

The third leg of the "A" channel signal is routed through a high-pass filter to the top of the channel "A" level control. The signal from channel "A" is fed to the tone control, from the tone control, the signal is routed to the grid of V-305A. V-305A amplifies the signal which is then capacity coupled to a split-phase type phase inverter. The signal from V-305B is used to drive a pair of 6BQ5 tubes in the output stage of the "A" channel amplifier. An 8" speaker is used in the "A" channel and is mounted above the power supply chassis.

ECHO SWITCHES

The "B" signal channel from the "Volume Soft" switch is routed directly to the "Main" and "Echo" tablets on the control panel. The "A" signal channel, with or without reverberation is also available at the "Main and Echo" and "Echo Only" switch terminals. These two tablets will route both the "A" and "B" channel signals, either to the organ power amplifier, the tone cabinet or both together, depending on the position of the tabs.

NOTE: A slide switch is located on the back of the power amplifier chassis, just to the right of the tone cabinet outlet. This switch, when in the "Up" position disables both echo switches when the organ is to be used without a tone cabinet.

"B" CHANNEL

The "B" channel signal routed through the "Main and Echo" switches is likewise divided into three signal channels. One signal is used to drive the grid of V-304B, the output of V-304B is capacity coupled to the tone cabinet outlet, and provides the "B" channel drive signal for the tone cabinet.

Another leg of the "B" channel is through R-403 to a low-pass filter, and together with the signal from the "A" channel, forms the bass channel of the power amplifier. The third leg of the "B" channel is routed through a high-pass filter to the top of the "B" level control. The signal from the "B" channel level control is fed to the tone control. From the tone control, the signal is routed to the grid of V-308A.

V-308A amplifies the signal which is then capacity coupled to a split-phase type phase inverter V-308B. The signal from V-308B is used to drive a pair of 6BQ5 tubes in the output stage of the "B" channel amplifier. An 8" speaker is used in the "B" channel and is mounted above the power amplifier chassis.

"BASS" CHANNEL

Signals of "A" and "B" signal channels are fed through R404 and R403 respectively, combined and fed to a low pass filter, and then to the top of the bass level control. From this control the signal is fed to the grid of V-311A, is amplified and direct coupled to the grid of V-311B; a split phase type phase inverter. The signals from this tube are used to drive a pair of 7591 tubes in the bass channel of the power amplifier. A 15" speaker is used in the bass channel and is mounted above the power amplifier.

PERCUSSION SECTION

When using the upper manual "B" adjust key, all of the busbars in the upper manual, with the exception of the sub-fundamental, sub-third 7th & 9th harmonics are routed through the percussion switch assembly and the primary windings of the percussion matching transformer T-102. The 1-1/4 harmonic is routed likewise, but is not available on the drawbars. It is used only in the harmonic structure of the "chime" effect. With the percussion switches in the "Off" position, the signals from the manual busbars are routed directly to the upper manual drawbars. Depending on which percussion effect is in use, the harmonics necessary to produce this effect will be routed, first through the primary windings of the percussion matching transformer, and then on to the drawbars. The signals induced in the primary windings of T-102 are converted to push-pull and fed to the grids of V-104, the percussion gate. The percussion keying pulses are supplied to the grids of V-104 from the percussion and reiteration driver, or the "second voice" tab. The percussion signal which appears on the plates of V-104 is passed on to the grids of V-105, where it is amplified. The signal from V-105 is fed to the grids of V-106. The signal is taken off between the plate of V-106B and the cathode of V-106A and is fed to the percussion level control.

At this point, the percussion signal is mixed with the harp signal and is routed to the "Add Vibrato" switch in the percussion group.

HARP SECTION

The signal input to the harp keyers comes directly from the tone generator (frequencies 37 through 85). These signals are applied to the emitter of the transistors Q-501 (there are 49 identical circuits, one for each frequency). A small bias voltage (. 3V) is applied to the base of all harp keyers through 10K resistors. With the "Harp Sustain" Tablet and the "B" preset on the upper manual depressed, a keying voltage is applied to the harp control busbar. When a key in the range between the second "C" and the top "C" of the upper manual is depressed, the harp control voltage is applied through R-504 and R-502 to the base of Q-501. At the same time, this control voltage is applied to condenser C-502. The application of this voltage causes the transistor to conduct. This conduction will continue as long as the keys are depressed, and will continue after the keys have been released for a time predetermined by the discharge time of C-502.

The signals from the collectors of Q-501 are then routed through Q-521 and Q-522.

In addition to the above functions, the following also takes place; when the "Harp Sustain" tablet is depressed, the second harmonic busbar signal is routed through a primary winding on T-1003. The result is that anytime a key is depressed, a signal is induced in the secondary of T-1003. This second harmonic signal (same pitch as Harp Signal) is introduced to the emitter of Q-521. The purpose of this signal is to enhance the harp effect by providing an instantaneous signal in the harp channel.

The output of Q-522 is routed through the harp level control (R-530) and is then mixed with the percussion signal and routed to the "Add Vibrato" switch. Depending on the position of the "Add Vibrato" tablet, the harp will sound either with or without vibrato.

CYMBAL AND BRUSH GENERATOR ASSEMBLY:

This assembly is basically a "White Noise" generator feeding two gating transistors, the outputs of which are shaped and fed to a common transistor amplifier. (Figures 32 thru 32C.)

CYMBAL/PEDAL

With the "Cymbal/Pedal" tablet depressed, and a pedal depressed, a keying voltage is applied through R-911 to one plate of C-909. A like charge now appears on the opposite plate through Diode D-904. This voltage now passes through D-905 charging C-910 and applying the keying voltage to the base of Q-906. This voltage causes Q-906 to conduct, amplifying the "White Noise" from Q-904. This noise is coupled to the base of Q-906 through C-904. The setting of R-911 determines the amount of keying voltage, thereby controlling the "Cymbal" output level.

The collector circuit of Q-906 is a broadly tuned resonant circuit of approximately 8 kc. The output of this circuit is fed to the cymbal-brush amplifying transistor Q-903 and on to the expression control, and the "B" signal channel.

The decay time of the cymbal effect is governed by C-910 and R-916, while the shaping and keying are controlled by R-914 and C-909. The cymbal effect will occur each time a pedal is depressed.

BRUSH/UPPER & LOWER

With the "Brush/Lower," "Brush/Upper," or both tablets depressed, and a lower or upper manual key depressed, a small variation in D. C. voltage occurs at the base of Q-901. This small variation is amplified by Q-901 and appears as a larger varying potential on one plate of C-901. A like variation now appears on the opposite plate through Diode D-901. This voltage now passes through Diode D-902, charging C-902 and applying the voltage to the base of Q-902. This voltage causes Q-902 to conduct, amplifying the white noise from Q-904. This noise is coupled to the base of Q-902. The collector circuit of Q-902 is a broadly tuned resonant circuit of approximately 11 k. c. The output of this circuit is fed to the Cymbal-Brush amplifying transistor Q-903 and on to the expression control. R-909, a variable resistor on the collector of Q-901 controls the "Brush" output level.

The decay time of the brush effect is governed by C-902 and R-903.

BRUSH AND PERCUSSION KEYING CIRCUITRY:

In the following text points A, B, C etc. refer to circled points on the diagram.

Because of the new type circuitry being used in this instrument, a simplified schematic, figure 36, and the following description will be used to describe its functions.

Lower Manual Brush Keying

100 volts is supplied through R-1004 and R-1003 to point A. A stabilizing condenser, C-1004, is located at the junction of R-1004 and R-1003. With the "Brush Lower" tab depressed, 100 volts will appear at point D. Point D is a common supply line for the 61-220K 1/2 watt carbon resistors. The opposite ends of these resistors are connected to the 61 Brush Keying Contacts, one under each key of the lower manual.

When a key is depressed, the Brush Keying Contact under that key makes to the grounded Brush Keying Bus-bar. At this moment, a voltage divider is formed, made up of R-1004, R-1003 and the 220K resistor within the manual. A slight voltage drop (negative keying pulse) now takes place at point A. With the first key held down and another key depressed, a voltage divider is now formed, made up of R-1004, R-1003 and the two 220K resistors within the manual. Again, a slight voltage drop (negative keying pulse) takes place at point A and the top plate of C-1003. *This change will also appear on the opposite plate of C-1003 and the base of Q-901; point B. This keying pulse will be amplified by Q-901 and will appear at the collector as a positive-going voltage. This amplified positive pulse will appear on the collector side of condenser C-901, and the opposite side of C-901 will respond to this change in potential. D-901 provides a ground path for negative charges, while D-902 will pass this positive voltage to the brush gate Q-902. See the complete schematic for the continuation of Brush Keying Path.

Upper Manual Brush Keying

As you will note from the schematic, regardless of the position of the "Brush Upper" Tab, 100 volts will appear at point E. Point E is a common supply line for the 61-220K 1/2 watt resistors. The opposite ends of these resistors are connected to the 61 Brush Keying (percussion control) Contacts, one under each playing key in the Upper Manual.

With the "Brush Upper" Tab in the off position and a key depressed, a voltage divider is formed, made up of R-1004, a 220K resistor within the manual and D-601 (20V Zener). The function of D-601 is to maintain a fixed voltage in the low end of the voltage divider network regardless of the number of keys depressed. Refering back to the voltage divider formed with a single key depressed, a slight voltage drop will take place at point E (negative keying pulse). This will not produce a Brush Keying Pulse because of the stabilizing effect of C-1004. With the "Brush Upper" Tab in the on position, point E will be connected to point A. When a single key is depressed, the Brush Keying (percussion control) contact makes to the Upper Manual Brush and Percussion Keying Bus-bar. At this moment, a voltage divider is formed consisting of, R-1004, R-1003, the 220K resistor within the manual and D-601. A slight voltage drop (negative keying pulse) now takes place at point A, with the first key held down and another key depressed, a voltage divider is now formed, made up of R-1004, R-1003, two 220K resistors and D-601. Again, a slight voltage drop (negative keying pulse) takes place at point A and the top plate of C-1003, from this point on refer to text following asterisk (*) in "Lower Manual Brush Keying description".

Percussion Keying:

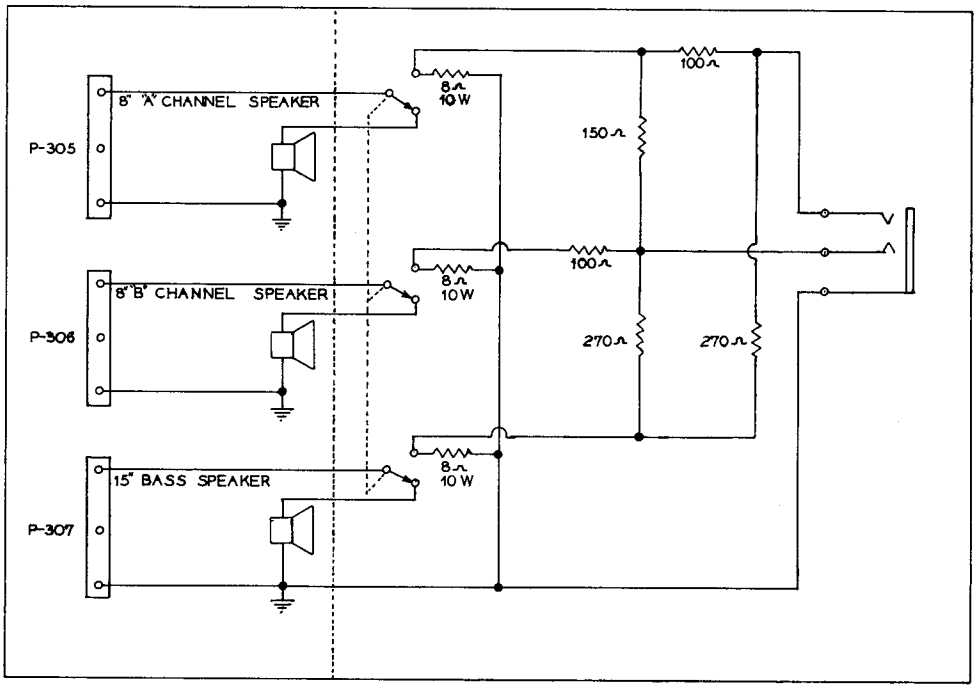
As noted previously, 100 volts is available at all times at point E. Anytime a key is depressed, this voltage is routed to the busbar, through one or more 220K resistors within the manual where it is clamped by D-601. In order to utilize any of the percussion voices it is necessary to depress the upper manual "B" adjust key. Anytime a playing key is depressed with the "B" adjust key latched, the clamped busbar voltage will appear at point F. Now, when a percussion voice is used the voltage at point F is routed through L-201 and D-202 to ground. D-202 is a 6 volt Zener and when a percussion voice is used it is electrically paralleled with D-601. Because of its lower break-over voltage, D-202 will now provide the clamping action on the busbar instead of D-601.

With the "Touch Control" tab in the up position, the following takes place anytime a playing key is depressed; the voltage at point E will be routed through a 220K resistor within the manual, to the busbar, through the "B" adjust contact, through a percussion switch, through L-201 and D-202. The voltage will cause D-202 to conduct. When this diode breaks-over, an inductive kick is induced across L-201. This provides the percussion keying pulse which is fed to Q-201 where it is amplified and fed to the percussion control tube. With the first key held down and another key depressed, an additional 220K resistor is paralleled with the 220K resistor under the first key. Additional current will now flow through the system creating a second inductive kick across L-201 which is again amplified by Q-201 and fed to the percussion control tube. This same cycle will be repeated for each additional key depressed. This effect is known as Legato Percussion, in that any previsouly held keys will repeat when another key is depressed

With the "Touch Control" Tab depressed, the input to the percussion pulse amplifier Q-201 is connected to the top of the Zener diode D-202. When a single key is depressed the voltage at point E will be routed through a 220K resistor within the manual, to the busbar, through the "B" adjust contact, through a percussion switch, through L-201 to D-202. This voltage will cause D-202 to conduct. The voltage now present at the top of the diode (percussion keying pulse) is now amplified by Q-201 and fed to the Percussion Control Tube. If any additional keys are depressed while the first key is held down, additional current will flow through the system, including D-202. Because of the regulating qualities of this diode, the voltage at the top of D-202 will remain constant regardless of the number of keys depressed. To generate another percussion keying pulse all keys must be released and another key, or group of keys depressed.

REITERATION DRIVER

With the "Reiterate" tab, and percussion tab, the "B" preset depressed and any playing key on the upper manual held down, voltage will be supplied for the operation of the reiterator circuit. Under these conditions 6 volts from the top of Diode D-202 will be applied to the base of the reiterator driver Q-202. This causes Q-202 to conduct and produces a large pulse at the collector which by the virtue of the blocking transformer T-201 immediately stops further conduction. At the same time, this pulse is taking place in the emitter circuit charging C-204 through D-201. The charge on C-204 is now dissipated through R-207 and R-208 (Reiteration Rate Control). The reiteration rate is variable from 4 to 20 cycles per second. The Reiterator Driver will not conduct again until the charge on C-204 has been dissipated thereby dropping the emitter voltage to a point where it will conduct again. As long as a key, or keys are depressed, the reiteration action will continue.



The above are recommended earphone connections for use with the Model H-100 organ. All parts to the right of the dotted line can be mounted in a small box on the front of the organ in easy reach of the organist. We recommend the use of a good quality earphone such as the Koss SP-3X, David Clark Model 200, or Telex Combo Model.

At the right is shown a recommended method of attaching a phonograph to the Model H-100.

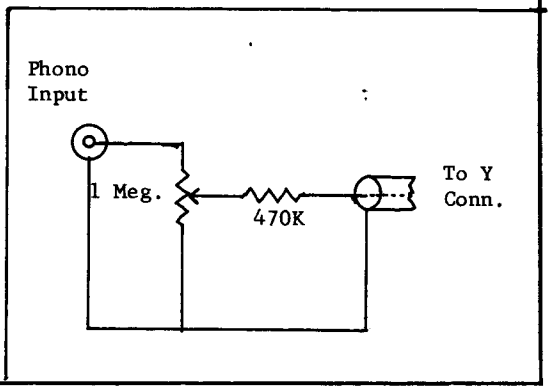


FIGURE 33 PHONO AND EARPHONE CONNECTION DIAGRAMS

SPECIAL EQUIPMENT

RADIO, PHONOGRAPH, OR MICROPHONE

A phonograph, radio, or microphone amplifier will play through the organ speakers if connected to the grid, pin 9 of V-302. This can be performed without going into the power amplifier, in the following manner. Purchase a Switchcraft type 330F "Y connector". Remove connector cable from GRA terminal on power amplifier. Insert "Y" connector", and reinsert connecting cable previously removed. The jack remaining open will now be a phono input. For diagram showing this connection see Figure 33 above.

The device (radio, phonograph, or microphone) should have an output level of about 10 to 20 millivolts maximum, and must have its own volume control, as neither the expression pedal nor the "Volume Soft" tablet will affect it. The reverberation tabs must be on to use the phono input. The organ may be played at the same time.

EARPHONE CONNECTIONS

Earphones can be added to the console for practice purposes so as not to disturb others. One method of attaching earphones is shown in Figure 33 above.

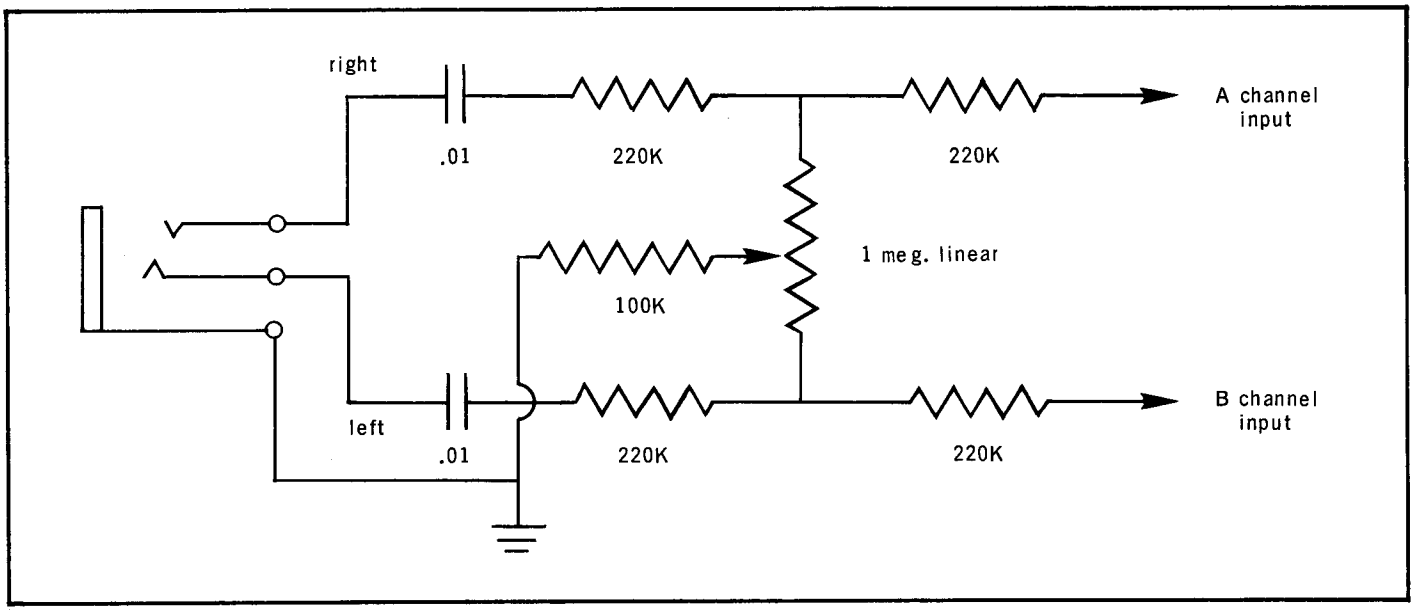
STEREO INPUT FOR H-100 ORGANS

Stereo tapes or other devices can be played through the H-100 organ, taking advantage of the reverberation and the three channel amplifying system. The system shown provides the necessary isolation and balance control for the stereo channels. The point of insertion in the signal line is such, that about 2.5 to 3 volts of program material is necessary at the input to achieve full output from the organ system. This signal level is generally available at the speaker voice coils of the tape or record player.

To tap into the organ signal lines it will be necessary to remove the back and top of the organ and the top cover of the control switch assembly. Locate the terminal board behind the main and echo tabs. This board has 8 lugs across the top. Looking from the rear of the console, the second lug from the left is the "A" channel input. The third lug from the right, is the "B" channel input. Solder a shielded lead assembly to each of these points and bring them out to a convenient location. Add circuit as shown below.

NOTES: The volume soft tab will effect this system.

The organ may be played simultaneously with the tape or record player.



If less bass response is desired reduce the value of the .01 condensers.

FIGURE 34.

EXTENSION SPEAKERS

Additional speakers of the permanent magnet type, may be attached to the organ if special circumstances make it desirable. They should be connected to the voice coil terminals of each of the console speakers. It is essential that the extension bass speaker be at least 12 inches in diameter and mounted in an adequate baffle to bring out the organ pedal notes properly.

Hammond Organ tone cabinets may be used as extension speakers. There is a seven pole receptacle located on the main power amplifier chassis for this purpose.

SPECIAL POWER SOURCES

The organ must always be connected to an alternating current source of the voltage and frequency specified on the name plate. If the only available power source is direct current or has a frequency different from that specified, it will be necessary to provide a converter or motor generator of at least 350 watts capacity.

If the frequency of the power source is not regulated (that is, if an electric clock will not keep correct time), the pitch of the organ will not be correct and may be irregular. In this case write to the factory service department for assistance, being sure to give all pertinent information.

PRACTICAL SERVICE SUGGESTIONS

ORGAN DOES NOT PLAY

(a) If the generator motor does not operate when the switch is "ON" and if the tubes do not light, check the power wiring, power switch, line cord, line cord plug, and wall outlet. On organs with Serial No. 15000 and up, check circuit breaker. If breaker is tripped, reset. If tripping again occurs within a few seconds, further checks will be necessary to determine cause of overload.

(b) If the generator turns and the tubes light, but no sound is obtained with all controls in playing position, the most likely source of trouble is the amplifier. In most respects this is a conventional amplifier circuit, and the schematic diagram, Figures 40 and 41, will enable the service man to locate the trouble.

ONE KEY DOES NOT PLAY OR A HARMONIC IS MISSING

(Tests to be made with "Adjust Key" depressed)

This may mean a dirty key contact, a broken connection, or a dead note in the generator. The steps below will serve to isolate the trouble.

(a) Ordinarily only one of the several frequencies used on the key will be missing. This can be determined by holding the key and operating each drawbar for that manual, observing on which drawbar the key fails to play. Reference to the manual wiring chart, Figure 17 will tell which frequency number is missing.

(b) See whether the same frequency is missing where it is used on other keys of the same manual. The wiring chart will tell with what other key and what other drawbar you should get the same frequency. If it is missing on one key but not on others, a key contact is probably dirty. In some cases it may be cleared by striking the key 15 or 20 times in a rapid staccato manner to loosen the dirt. If this procedure is not effective, adjustment of the busbar shifter for that manual will clear it. (See "Manuals" section on prior page for location and manner of adjustment.) This will slide the busbars endwise so that they present a clean contact surface. In extreme cases, it may be necessary to hold down the faulty key while making the adjustment.

(c) If the frequency is missing on all keys of one manual but not on the other manual, look for a break in the cable connecting one manual to the other.

(d) If the frequency is missing on both manuals, check the manual-to-generator cable or the generator itself.

(e) The output of any single frequency on the tone generator may be checked by connecting a clip lead from the preset panel top bar to the generator terminal in question. If the generator is alright, the note will play loudly.

CAUTION: Never test the tone generator with an outside source of current such as a continuity meter, as serious damage may result to the sensitive filter transformers and permanent magnets. By the above method, all necessary tests of the tone generator may be made with the current supplied by the generator itself.

(f) If it fails to play, try touching the clip to the input side of the filter coil (not the grounded tap) and the input side of the filter condenser (figure 14) in order to check these parts. Disconnect the condenser to eliminate the possibility of a grounded transformer. If the signal is still missing at the magnet coil terminal, it means that the tone wheel is not turning, the coil is defective, or the magnet is not properly adjusted.

(g) If the tone wheel is not turning, the frequency of the other wheel on the same shaft will also be missing (with the exception of a few wheels which are alone). On the generator magnet location (figure 15), the two frequencies whose numbers are connected by a dotted line are on the same shaft. Another way to check the wheel is to raise the generator slightly and feel the wheel with your finger to see if it is turning. Each wheel is located directly behind its magnet, shown in figure 15.

(h) If the magnet coil is defective, the generator must be returned to the factory, as replacement of a coil necessitates dismantling the entire generator.

(i) It is possible, although unlikely, that the magnet may have become loose and moved so far from the wheel as to make the note inaudible. It may be adjusted as described in the following paragraph.

ONE NOTE IS WEAK

(a) Trace the note, as described in the preceding section, to see whether weakness is due to dirty contact, poor connection, defective filter or reduced output of magnet coil. Check at each point by comparing intensities with higher and lower frequency numbers.

(b) It is possible that one or more notes may be acoustically weak, due to the room and the furnishings, although the actual signal level is equal to that of adjacent notes. This can be checked by reading voltages of the various notes on an output meter connected to the voice coil terminals on the amplifier. All notes will not give equal output, but voltage should vary smoothly from note to note. In this test variations of less than 30% should be ignored.

(c) Each magnet is set at the factory, with the set screw partially loosened, while observing an output meter. Experience has shown that the magnets seldom need adjustment and that setting them without proper equipment involves danger of damaging both magnet and wheel. Therefore, it is not recommended that the service man attempt this adjustment.

HUM

(a) A loud 60 cycle or 120 cycle hum in the speaker may come from some nearby electrical appliance. It may be picked up by the matching transformer, the vibrato line, or the console wiring.

It may be eliminated by moving either the console or the appliance.

(b) Any other hum must originate in the amplifier circuit, and can generally be cured by replacing one or more of the electrolytic condensers.

(c) In case hum originates in the amplifier but is not due to the electrolytic condensers, its source can be isolated by successively removing tubes or by grounding successive points in the signal circuit.

REPLACING TUBES

(a) The vacuum tubes are all standard radio types and can be tested in the usual way. Figure 40 shows the location of tubes in the amplifier.

(b) If tube V-104 is replaced, check percussion cutoff adjustment as explained under "Adjustments".

PROCEDURE FOR REMOVING PARTS IN NEED OF REPAIR OR REPLACEMENT

The following procedures require the removal of back and top. The back is removed by taking out the fifteen visible screws. Top removal is accomplished by taking out the two screws which secure it to the back stretcher. The front of the top has a snap fitting, released by pulling up.

NOTE: The music rack light cable must be disconnected before removing top.

TO REPLACE A BROKEN TAB OR REMOVE A TAB SWITCH ASSEMBLY

(a) Remove the Phillips screws from front of control panel that hold bank of switches associated with tab or switch to be replaced.

(b) To replace a tab, remove lock washer from either end of switch assembly, and pull rod out so it just clears broken tab. It may be necessary to tilt assembly so that free end of rod will clear adjacent switch assembly.

(c) Remove remains of broken tab and insert new piece.

TO REPLACE PILOT LIGHT OR POWER SWITCH (First pull out line plug)

(a) These items accessible with top removed.

(b) Replace bulb with No. 12 GE 6.3V, .15A miniature 2 pin.

(c) To replace power switch, remove two black leads from plug at generator.

(d) Compress springs on sides of switch and push through front of control panel.

TO REMOVE DRAWBAR ASSEMBLIES:

1. Remove rear panel and console top (unplug music rack light before removing top).

2. Remove eight 1/4" Hex Head Screws from control panel cover and remove cover.

3. Remove reiteration rate knob, cymbal-brush volume knob, and retaining nut and washer behind knobs.

4. Remove twelve phillips head screws holding tab switches and four phillips head screws holding face plate.

5. Pull all drawbars out, tilt control panel forward and lift out (make certain that wires leading from pilot light and On-Off switch have enough slack to clear end plate). Rest control panel plate on rear stretcher rail.

6. Tilt control switch assemblies up, and out of way. Note: It may be necessary to tie switches back.

7. Unsolder copper conductor strips from drawbar ends (handle conductor strips with care).

8. Remove eight 1/8" hex head screws holding stop switch assembly to base plate.

9. Transfer busbar leads from removed stop switch assembly to new assembly.

To reassemble, reverse above procedure.

TO REPLACE UPPER MANUAL KEY:

1. Remove rear panel and console top (be sure to unplug music rack light before removing top).

2. Remove eight 1/4" hex head screws from control panel cover and remove cover.

3. Remove the two 1/4" hex head screws holding percussion amplifier to the control panel base.

4. Remove two 1/4" hex head screws at center sides of cymbal-brush board and slide board toward front of organ and out of tracks.

5. Remove two 1/4" hex head screws and one phillips head screw at each end of stop switch base plate.

6. Tilt control panel assembly backwards to gain enough clearance to loosen the 1/4" hex head screws securing the key and channel assemblies.

7. Lift key channel up and toward rear. Note: Associated black keys must be removed before white keys can be removed. To reassemble, reverse above procedure.

TO REPLACE LOWER MANUAL KEY:

NOTE: To preform the following operations you will require the use of a ratcheting offset (yankee) screw driver with an extension handle. This handle may be a piece of flat steel stock taped to the tool so that its over all length is about 9 inches. Another helpful item is a 6 X 6 inch piece of 1/8" masonite.

1. Remove the upper manual front strip.

2. Remove the 4 hex head screws securing the front tabs the lower manual cover. Insert a screw driver between the cover and console front rail and push cover down.

3. By looking in the space between the bottom of the playing keys and the top of console front rail identify the key comb assembly associated with the key to be replaced.

4. Remove the two screws that secure the key comb to the manual bed. It may be necessary to tap key comb lightly to release it.

5. After keys are released remove key comb from channels.

6. Slide 6 X 6 inch piece of masonite under keys in area previously occupied by the key comb.

7. Setting ratchet so as to loosen, line up blade of offset screw driver with slot in screw of key to be removed.

8. After screw driver is positioned depress key against screw driver which is in turn backed up by the piece of masonite. Operate rachet until screw is removed.

9. Repeat this operation for other screw and reverse procedure to replace key.

CAUTION: Do not overtighten screws when installing new key.

HINT: When reinserting key comb leave all keys in their UP position being careful not to turn back the up stop felts located in key channels.

REPLACE CELESTE SCANNER:

1. Remove console rear panel

2. Remove console top (be sure to unplug music rack light).

3. Remove the left hand shield cover behind control panel.

4. Release all cable ties in upper half of console.

5. Remove the two black shielded leads, one from the common celeste amplifier (this lead is the longest one) and the other from the second celeste amplifier.

6. Remove four 7/16" hex head generator mounting bolts.

7. Move the left end of generator out as far as wiring will permit. NOTE: Right end will have to be moved some to accomplish this.

8. Remove Scanner Drive Belt.

9. Unsolder wires from celeste line box.

10. Remove the four 1/4" Scanner Bracket mounting bolts. NOTE: A short 1/4" box end wrench or spin-tite would be useful here.

11. Remove celeste scanner.

To install reverse above operations.

ROTOR ALIGNMENT - CELESTE & VIBRATO SCANNERS

To realign the Vibrato Scanner rotor, it is necessary to cock the generator in the console so that the cover of the scanner may be removed.

The scanner rotor is held in position on the shaft by a set screw which may occasionally work loose. Early scanners have only one set screw, while later scanners are equipped with two set screws. The procedure for the realignment of the rotor is the same in either case.

It will be noted that the stator plates of the scanner have a small notch located near the phenolic back plate. The set screws are of a Bristol socket head type. By looking down between the plates with a flashlight, it will be evident as to whether or not the scanner has one or two set screws. In either case, loosen set screw (or screws), securing the rotor on the shaft. To accomplish this you will require a long #6 Bristol Spline Wrench.

After loosening the set screw (or screws), leave the wrench engaged in the set screw; this will hold the rotor. With the rotor now immovable, rotate the shaft, in the direction which will place the rotor plates in the center of the stator plates. When this is accomplished, retighten the set screw to prevent any further movement.

CAUTION!!! Scanners with one set screw should not be tightened too securely. The set screws on these scanners provides a dual purpose. It not only locks the rotor on the shaft but also provides the ground path for two resistors which bleed off any charges built up on the rotor-condensor plates.

On scanners with two set screws, one set screw provides the grounding function, while the other provides the major locking tension.

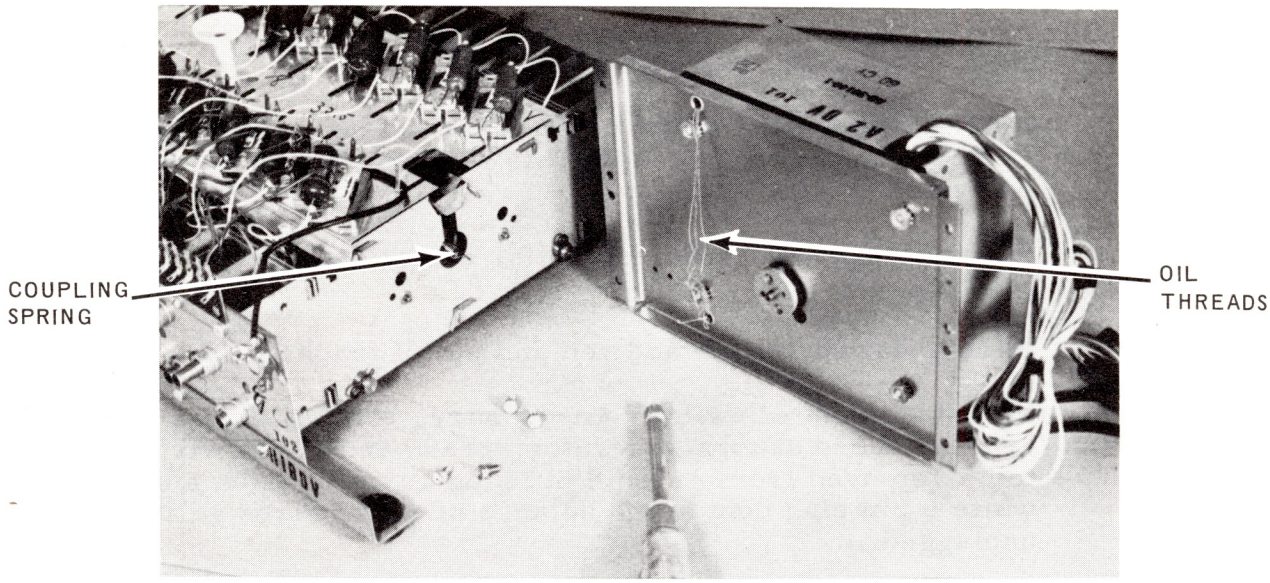


FIGURE 35. VIBRATO SCANNER

REPLACE VIBRATO SCANNER:

1. Follow procedures in steps 1 through 4 of Celeste Scanner replacement instructions.

2. Remove the right hand shield cover behind control panel.

3. Remove the two black shielded leads; one from the Common Vibrato Amplifier (This lead is the longest one), and one from the second Vibrato Amplifier.

4. Remove four 7/16" Hex Head Generator Mounting Bolts.

5. Remove Round Head Bolt and Nut holding Grounding Cables at extreme right end of Generator Terminal Strip.

6. Move the right end of generator out as far as wiring will permit. NOTE: Left end will have to be moved some to accomplish this.

7. Remove the four 1/4" Scanner Bracket Mounting Bolts. NOTE: A short 1/4" box end wrench or spin-tite would be useful here.

8. Move scanner away from generator end, taking care not to lose coupling spring.

9. Unplug green and white nine pin connectors leading from scanner to the vibrato switches.

10. Mount scanner on generator by reversing above procedure. NOTE: Extreme care will have to be taken to be certain that coupling spring is properly aligned and connected using the small hole. Be sure to insert the oil threads from the scanner into the generator oil trough.

TO REMOVE PEDAL SWITCH:

1. Remove console rear panel.

2. Release tie holding pedal cable to console base and feed excess cable through hole in base. This will provide the slack needed to pull pedal switch out.

3. Remove two 5/16' hex head bolts, one at each end of mounting bracket.

4. Slide pedal switch toward you and out of tracks.

5. If replacement of switch is necessary, pedal harness will have to be unsoldered at tone generator, green and violet wires will have to be removed from green 9 pin plug on percussion amplifier and white 6 pin plug containing balance of pedal wires will have to be unplugged.

6. Feed balance of pedal cable through hole in console base.

To install new pedal switch, reverse above procedure.

TO REMOVE PEDAL SWITCH COVER:

1. Remove nine self-tapping screws holding bottom of pedal cover to pedal mounting bracket.

2. Remove thirteen 1/4" hex head screws holding back of pedal cover to top pedal cover.

3. Remove four round head screws, two at each end holding pedal switch end brackets.

4. Remove cover by carefully sliding it over pedal cable harness.

To reinstall cover, reverse above procedure,

NOTE: Be sure to feed ground wire through cover and attach to cover with a 1/4" hex head cover screw.

TO REPLACE PEDAL SUSTAIN SOLENOID:

1. Remove pedal switch and switch cover.

2. Remove four round head screws holding pedal assembly end caps.

3. Unsolder the two solenoid leads from their respective terminals.

4. Draw out the two round solenoid bracket retaining rods until the correct solenoid has been freed. NOTE: Because the solenoids are riveted to the brackets, it will be necessary to replace both solenoids where there are two on one bracket.

To reassemble, reverse above procedure.

REMOVE EXPRESSION PEDAL:

1. Using a 1/4" ratchet drive with a long extension and 5/16" hex socket, remove the 4 screws securing the swell pedal to the console.

2. Slide pedal foward and by reaching around to the rear of the assembly unplug the connecting cables.

3. Remove swell pedal from organ.

To install, reverse above procedures.

VIBRATO CANCEL SWITCH:

The Vibrato Cancel Switch is an integral part of the Expression Control Pedal. Therefore, if replacement becomes necessary, the Pedal and Switch will have to be replaced as a unit.

REMOVE POWER SUPPLY CHASSIS:

1. Remove console rear panel.

2. Remove six pin, nine pin and twelve pin plugs (it is necessary to depress the locking clips on either side of the six and nine pin plugs to release them).

3. Remove four 5/16" hex head mounting screws. Chassis can now be removed.

To reinstall, reverse above procedure.

REMOVE REVERB. - POWER AMPLIFIER CHASSIS:

1. Remove console rear panel.

2. Remove associated cable ties.

3. Remove twelve pin plug P703 from power supply chassis.

4. Remove pins 5 and 8 from P703.

5. Remove twelve pin plug from power amplifier chassis. (It is necessary to depress the locking clips on either side of the twelve pin plugs to release them).

6. Remove gray and black shielded cables from power amplifier chassis.

7. Remove three speaker plugs from top of chassis.

8. Remove four 5/16" hex head mounting screws. Chassis can now be removed.

To reinstall, reverse above procedure.

OPERATION OF MECHANISM ON PRESET KEYS

In their basic construction the preset keys are identical to the playing keys. Each has a plastic key mounted on a metal channel, pivoted in the rear and with a guide toward the front to minimize side motion.

On the front edge of each channel of the 9 preset keys and 2 adjust keys, two flat springs are attached, one 3/8" long of rather stiff material, and another approximately 5/8" long of soft plastic. The softer long spring is sandwiched on top of the stiff spring, nearest to the key. The cancel key has only one heavy spring approximately 1" long.

When a preset key is depressed, the longer soft spring is forced downward and snaps under a tubular rod which is part of the cradle. The cradle is constructed of two tubes approximately 6" long and assembled 3/4" apart. One tube is used as a fulcrum, the entire assembly being mounted perpendicular to the preset keys. A spring and bumper hold the cradle at a 60° angle toward the front of the console.

Once a key has been depressed, the soft spring remains under the tube. It is backed by the short stiff spring to give it sufficient tension to hold the key down. When the next preset key is depressed, the cradle is forced down and outward, permitting the previously actuated key to come up, but again locking the one last depressed.

If two preset keys are depressed at once, both will lock down. The cancel key with its long stiff spring is then used and forces the cradle down, causing all preset keys depressed to return to their normal position. As there is no locking spring on the cancel key, it will immediately return to its normal position.

CRADLE ADJUSTMENT

If it is determined that adjustment is necessary for proper operation of preset keys, the left hand end block of the manual needing adjustment should be removed. The upper or lower manual assembly will have to be raised to gain access to the screws holding this block. After removal of this block, the end of the cradle will be visible. Also visible will be the stop felt and bracket assembly. This is a small angular bracket faced with a small piece of felt. This bracket is slotted and after loosening the retaining screws, can be moved either forward or backward to effect an adjustment. It should be moved forward to decrease holding tension and backward to increase tension. Additional movement in either direction can be obtained by loosening the two screws from underneath, holding the cradle assembly and moving it forward or backward.

TECHNICAL BULLETIN 35

The following changes are recommended to correct the percussion and reiteration thump on the H-100. To give the serviceman some flexibility in making the change we have listed two alternates. Alternate "A" change provides correction without requiring that the serviceman remove the AO-72 amplifier chassis. Alternate "B" change, which is identical to the change to be made in production, requires removing the amplifier chassis. It should be made clear that only one of the methods should be implemented.

METHOD A

1. Insert a .001 mfd. capacitor in series with the output lead of the percussion amplifier. This is the shielded lead which connects from plug P103 on the chassis to R1025 on the ADD VIBRATO switch on the control panel. This change can readily be made in the vicinity of the switch.

2. Add a .002 mfd. capacitor from the wiper arm of potentiometer R210 to ground. This capacitor can be added in the vicinity of the pot which is on the control panel.

METHOD B

1. Replace C118 (.047 mfd.) with a .0015 mfd. capacitor.

2. Replace C114 (.0039 mfd.) with a .0056 mfd. capacitor.

TECHNICAL BULLETIN 42

"ADD VIBRATO" TAB

To reduce "pop" when depressing "Add Vibrato" tab, change C-803 and C-813 to 2.2 MFD. tantalum capacitor. Our #AO 29615-3.

REITERATOR

To improve operation of reiteration circuit and prevent outplaying, a 12" violet wire has been added to the circuit in the following manner:

Facing the front of the organ, the violet wire is attached to the fourth terminal in on the reiterator chassis, and then to the last terminal in on the right side of the "Reiterate" switch.

The following Model and Serial Numbers indicate the point where this change has been incorporated in production:

H-110	#3998	H-143	#2765
H-111	#2129	H-182	#3108
H-112	#3687	H-195	#2498

It is suggested, this change be made on earlier H-100 instruments during the course of normal service.

TECHNICAL BULLETIN 46

To improve Bass response, substitute .082 MFD capacitors for C-650 and C-651. These capacitors are now .15 MFD, and are located on the Expression Control.

SUBJECT: HARP CIRCUIT CIPHERS

PROBLEM: Cipher present with all tabs up and presets cancelled.

Depress ADD VIBRATO tablet. If vibrato is added to cipher, harp keyer problem is indicated.

FINDING THE CIPHER

There are 49 harp effect keyers, starting at C2 (playing key 13) of the upper manual, and ending at key #61.

These harp keyers will be referred to as numbers 1 through 49 for the sake of simplicity, although they do not correspond to the generator frequencies used to produce the harp effect, nor to the numbering system used in the service manuals.

Locate the harp keyer number by starting at either the high end of the keyboard, or C2 (key 13), whichever is closest to the pitch of the cipher. Depress the HARP SUSTAIN tablet and count the number of keys between the starting point and the key which zero beats, in pitch, with the cipher.

Example: The fifteenth key above C2 (key 13) zero beats, in pitch, with the cipher. C2 (key 13) is Harp Keyer #1. One plus 15 = 16. Therefore, Harp Keyer #16 is at fault.

Conversely, if key #5 (counting down from key 61) zero beats, in pitch, with the cipher, Harp Keyer #44 is at fault. (49 minus 5 = 44).

Position Harp Assembly so that all terminals are easily viewed, and so that the shielded cables are at the bottom left of the harp frame.

The Harp Keyers are numbered from top to bottom with the 49th keyer the bottom-most of the group of 5 keyers on the left-hand printed wiring board. Keyer #1 is at top right of the frame.

There are two terminal posts for each keyer. The one on the left side of the P. W. B. is the signal input - the one on the right - keying. All wires to signal input terminals are of one color. Two colors are alternated in the keying cabling. No specific colors are given as the color of the wiring has changed several times.

Use a jumper with alligator clips at each end, and ground the signal input terminal of the suspect keyer to the generator frame. The cipher should now stop.

Next, unwind the wire-wrap to the keying terminal of the suspect keyer and check for voltage between the disconnected wire and ground. There should be zero volts with no key depressed. If voltage is present (approx. 100 V DC), this indicates an internal manual short between the Brush/Cymbal keying and Harp keying busses. In most cases, no voltage will be read and the transistor in the keyer circuit may be replaced.

Insure that all removed wires are <u>soldered</u> back on.

TAB REPLACEMENT

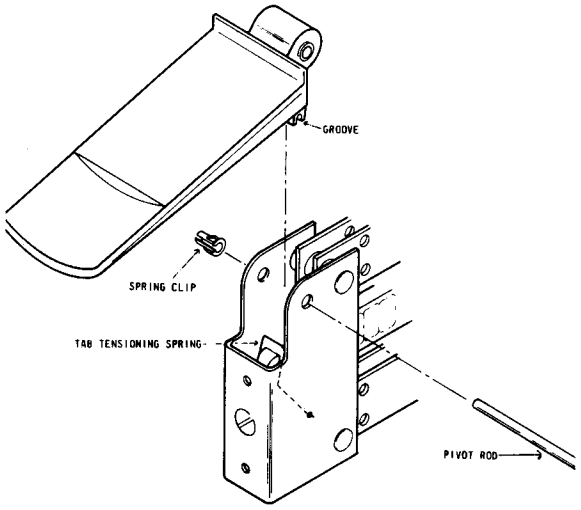
In the H-100 organ there are six separate switch assemblies which comprise the control assembly. When tab replacement is necessary, it is required to work on only the particular assembly containing the tab to be replaced.

To replace a tab, remove external parts of console as required for access and proceed according to the following:

1. Remove two black Phillips screws which fasten switch assembly to control panel.

2. At rear of each switch, remove screw which fastens switch to assembly frame.

3. Remove black spring clip from end of tab pivot rod, (See illustration).



4. Lift switch assembly from frame so that pivot rod can be moved. Note positions of any spring clips fastened between tabs. These clips must be returned to original positions when work is completed.

5. Drive pivot rod as far as possible with a small, light hammer. Then use a 1/8-inch steel rod (another pivot rod, if available) to drive rod through tab to be replaced.

   When pivot rod has been driven just beyond tab, pull back driving rod sufficiently to permit removal of tab. Remove tab.

NOTE

In some instances, it may be necessary to loosen and lift adjacent switch assembly to provide space for movement of pivot rod.

6. Move switch to approximately midpoint of its travel. Insert new tab, making certain that groove in actuating end of tab engages tab tensioning spring in switch frame. See illustration.

7. Align new tab with holes for pivot rod, and insert driving rod to retain tab temporarily. Drive original pivot rod through tab. Continue driving pivot rod until it has been returned to its original position. Driving rod will drop out.

8. Reattach spring clip removed from end of pivot rod. Return other spring clips, if present, to their original locations.

9. Reseat switch assembly in assembly frame. Reattach screws removed in Steps 1 and 2.

REPLACEMENT OF V311 (Refer to Figure 51A)

When replacing V311 in organs manufactured before July, 1969, it is recommended that the following modifications be made to the power amplifier.

1. Add C374, C375, R425
2. Change R409 to 1.2K
3. Change R414 to 1K

PERCUSSION KEYING BY PEDAL SOLENOIDS (Refer to Figure 45, Sheet 2 of 3)

To correct percussion keying by pedal solenoids, connect a short jumper from the ground side of Zener diode D1 to nearest ground lug on rear of upper manual. The diode is located on a terminal strip at left (rear view) of upper manual.

PEDAL SWITCH ASSEMBLY (Serial Nos. below 15000)

It has been noted on early Model H organs that there can be a condition of harmonic drop-out when String Bass is being used. Most servicemen will begin trouble-shooting this problem with the analysis that the latching solenoid simply has not latched. This will lead them to believe the problem is a voltage adjustment or solenoid malfunction.

However, the problem stems from the fact that there is a considerable tension difference in the contact to bus bar connection when a person manually plays a pedal versus that of a latching solenoid in String Bass operation. There have been incidents of the pedal not sustaining in String Bass operation. This malfunction could be due to:

1. Mis-adjustment of the solenoid voltage
2. Bad latching solenoid
3. Dirty contacts.

Where voltage or solenoid is not the problem, shift the pedal bus bar and notice whether there is improvement in the operation. If improvement is evident, lubrication of the pedal signal busses should provide permanent correction.

This process is a 1/2 hour to 45 minute job, since the pedal switch assembly is easily accessible. In the switch assembly it will be noted that there are 6 bus bars, only the center four of which are signal bus bars. It is these four which should be lubed, the other two are for latching and cymbal keying.

PEDAL SWITCH ASSEMBLY REPLACEMENT (Serial Nos. below 15,000)

Pedal Switch Assembly No. A0-30372-1 is no longer available as a replacement. Pedal Switch Assembly No. 116-000020 should be used instead.

In order to adapt No. 116-000020 for use in older H-100 organs, the following modifications must be made.

Refer to Figure 43.

NOTE
This procedure valid only if A0-71-1 (127-000017) power supply is used.

1. After removing old pedal switch assembly (A0-30372-1), remove 6-pin plug from cable assembly. Set plug aside for later use.
2. Remove eight male pins from cable breakout of old switch assembly. Set aside for later use.
3. Install new Pedal Switch Assembly (116-000020) in console. Attach frequency leads to generator.
4. Remove (cut) 9-pin plug from new cable assembly.
5. Strip cut ends of wires and solder to eight male pins removed in step 2.
6. Separate green and violet leads from cable, and insert into plug P105; green into position 5; violet into position 8.
7. Insert remaining six pins into plug removed in step 1, in accordance with color breakout (refer to female side of plug). Mate plugs (P609).
8. At the A0-71-1 (127-000017) Power Supply insert black lead into position 5 of P702.
9. Insert white/red lead into position 5 of P703.
10. Near break-out point of leads inserted in steps 8 and 9, cut white/black lead in cable harness.
11. Install two male pins to cut ends (pins needed may be removed from old harness).
12. Install white/black lead from P609 into position 8 of P703.
13. Install remaining white/black lead (from pedal latching solenoid) into position 6 of P702.

VIBRATO SCANNER REPLACEMENT (Serial Nos. below 15000)

Scanner No. A0-30140-1 (32-section) is no longer available as a replacement.

Where vibrato scanner replacement is required, the following parts should be used.

Scanner #121-000067, (16-section)

Adapter Cable Assembly #011-042659

2 Capacitors #425-010582 (2200 pf)

The new scanner will mount on the organ in place of the old scanner.

The white 9-pin connector on the new scanner cable is to be mated with the 9-pin connector on the adapter cable assembly.

The remaining white and green plugs on the adapter cable assembly mate with the white and green plugs which were originally connected to the old scanner (cabling to vibrato switches).

On Common and Second Vibrato Amplifier boards, remove C822, and replace with No. 425-010582. For location of C822, refer to Figure 25.

Parts may be ordered from the Organ Service Department, 1740 North 25th Avenue, Melrose Park, Illinois, 60160.

PEDAL "POP", Serial Nos. above 15000.

The three corrections described below can be used to minimize pedal pop. However, some organs may require only the first; some organs may require only the first two; and some organs may require all three. Therefore, perform the corrections in the order given, checking carefully after each to determine whether a satisfactory result has been achieved.

I. Trouble Symptom: Any pedal depressed causes a pop when STRING BASS tabs are depressed.

Probable cause: Oscillation in Pedal Gate amplifier assembly, P/N 117-000004. This can be identified by turning the pedal level potentiometer R164, Figure 46, from one of its limits to the other. Noise in the speaker while the potentiometer is being turned is indicative of oscillation.

Remedy: Dress the leads soldered to R164 and change R170. Proceed according to the following:

a. Twist the yellow, black, and green leads connected to pins 4, 8, and 9 of P. W. Board 124-000008 tightly. Twist leads all the way to pins 8 and 9.

NOTE

It will be necessary to replace the existing black lead with a lead of sufficient length to permit twisting.

b. Make certain that the heavy blue and gray leads from P151 to the transformer are not twisted, but are parallel to each other from end to end.

c. Make certain that no remaining leads are pushed under the P. W. Board. Dress leads along edge of board.

d. Remove R170 (See Figure 36 for location) from board and replace with 1K, 1/2W± 10% resistor.

e. Readjust pedal level and pedal cut-off potentiometers on amplifier assembly.

f. Check pedal pop level by listening. If still too loud, or the following symptom is present, make the corrections described.

II. Trouble Symptom: With STRING BASS tabs depressed, first pedal depressed causes pop. Also, random pops are heard when changing from one pedal to another.

Remedy: Proceed according to the following:

a. Install a 50 volt electrolytic capacitor, Minimum 20 uf, maximum 50 uf, in power supply assembly, P/N 127-000025, between pin 6 of P702, Figure 52, and chassis ground. Positive (+) side of capacitor should be toward pin 6.

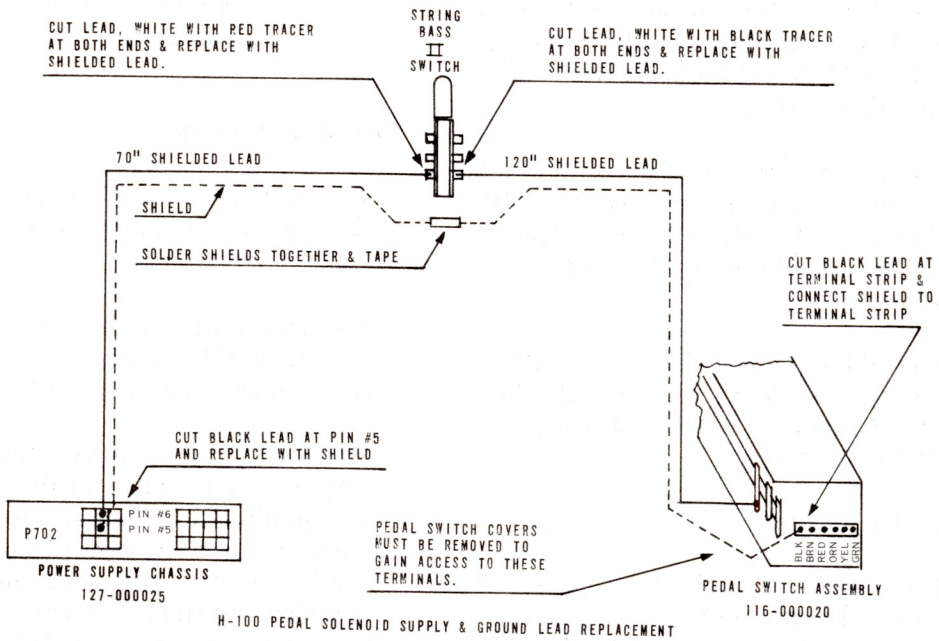
b. Install an 18-volt Zener diode, Motorola P/N 1N2982B in power supply, electrically parallel to the capacitor installed in step a. To install diode:

1. Drill a 3/16" hole in the vertical wall of the power supply near Q706, and mount the diode through the hole, with its threaded stud on the outside of the chassis. The chassis wall will serve as a heat sink for the diode.

2. Solder a black lead from the ground lug on the diode to the nearest chassis ground.

3. Solder a red lead from anode side of the diode to a convenient tie point common to pin 6 of P702. Suggestion: Collector of Q706.

III. If the foregoing operations do not bring pedal pop to an acceptable level, it will be necessary to replace pedal solenoid supply and ground leads with two 26 Ga. shielded leads as shown in the accompanying illustration. Complete instructions are contained in the diagram.



H-100 PEDAL SOLENOID SUPPLY & GROUND LEAD REPLACEMENT

NOTE. The modification illustrated is incorporated in production as of February, 1970.

NOTE

Connect two shields together and solder exactly as shown. Install insulation sleeving on all shields and tie new leads to existing cables neatly.

REDUCTION OF RIPPLE IN POWER SUPPLY TO PREVENT HUM MODULATION IN DELAY. GATE ASSEMBLY (124-000019). Serial Nos. above 15000.

In order to minimize ripple in 127-000025 Power Supply, change C705 from 100 uf, 50V to 500 uf, 30V, Hammond Part No. 407-070159.

This change is incorporated in latest production.

CONNECTION OF BELL & HOWELL CASSETTE

Mount cassette hanger to right side of lower manual bottom cover with four (4) self tapping screws. Connect cassette "aux" input to channel A speaker through 150K, to channel B speaker through 150K and to Bass Channel speaker through 100K resistors.

FUNCTIONAL CHECK OF BELL & HOWELL CASSETTE (294-H)

1. Is Recorder Getting Power?

   With or without cassette cartridge installed, depress "Play-Record" button. Level meter should read up-scale well into black area. If meter does not indicate, remove "Ext. Pwr" plug and check for voltage from organ.

2. If Recorder has Power, Will It Pull Tape?

   A. Install known good cassette cartridge. Depress "Play" button, advance Volume Control, remove earphone plug; recorder should play. Depress "Stop" button. Recorder should stop.

   B. Depress "F. Fwd" button. Tape should take up at a higher speed than in play. Note "F. Fwd." button does not lock down. This is normal. Depress "Stop" button. Recorder should stop.

   C. Depress and lock down "Rewind" button. Tape should rewind at approximately the same speed as the "F. Fwd." button. Depress "Stop" button.

3. Will Recorder Record?

   Insert blank cassette cartridge which does not have record lockouts removed from rear of cassette cartridge. Insert microphone to input connector. Turn switch on microphone to "on". Depress "Record" and "Play-Record" buttons simultaneously so that they both lock down. Speak into the microphone. Depress "Stop" and rewind to point of recording. Depress "Play". Recorded voice should be heard.

4. Does Speed Control Work?

   Insert music cartridge. Depress "Play". Vary speed control through range. A lowering and raising of tone should be noted.

5. Customer Complains of Poor Quality Recording.

   Depress "Play" button without cartridge installed. Using Q-tip and alcohol, clean heads. Caution: Do not scratch heads.

GENERAL

Cassette cartridges available on the market range from very poor quality to highly acceptable. As a general rule, a customer is advised to purchase the better known brand of tape. The cheapest tape frequently has poorly manufactured plastic parts and will not function well. Presently, regardless of manufacturer, the C-120 tapes have not been developed to the point of trouble-free use. If a customer complains of poor tape handling, insert a known, good name brand tape and observe the performance of the recorder.

CAUTION: Do not attempt to insert or remove cassette cartridge with push-button depressed. To do so will damage the recorder.

DRUM SCANNER

The exploded view of the drum scanner assembly (Figure 65) is to let you see how the unit is constructed.

This view is of a double pick-up type such as the Celeste or Vibrato as used in the H-300 and also the scanner conversion kit for the H-100.

However, it has been recommended by our Engineering Department that the scanner assembly should not be disassembled. Since several parts are coated with Aquadag, finger marks on the Rotor (item 10), or on the inside of the scanner shell (item 16), can cause a static build-up which, when reassembled, might cause distortion or excessive noise.

Mechanically Noisy

The following procedure should be followed to correct drum scanners that are mechanically noisy in the field. Reference is made to exploded diagram, Figure 65. The lubricant referred to as Darina Ax, is available from most Shell dealers.

1. Remove back nuts #21 and #24.

2. Remove end cap #20. Care should be taken to

withdraw cap straight from drum to avoid misaligning rotor bearing. With cap removed, ascertain that bearing is flat and fully inserted in end-cap. If not, bearing may be pressed with finger pressure.

3. Remove rotor, handling by steel shafts only. Touching the conductive surface could create a static charge that would result in an audible hum in the organ.

4. Apply lubricant to rotor (#10) shafts, washers #11, #12, and #13 and the small pinion so that lube covers all moving interfaces. Care should be taken so that no lube touches the palladium contact pins in rotor shaft or applying such an excess that might be flung off while operating.

5. Reassembly rotor and end-cap. Before tightening nuts, rotate rotor by turning pinion shaft. If gear and pinion are properly meshed, shaft should turn smoothly and with little effort.

6. Remove front and rear end-caps (#3 and #25) by removing screws #1, #27, and #28. Reassemble graphite brushes over contact pin. Note that lugs on brass assemblies #4 and #22 are uneven; the lower brush is assembled first. These brushes have been previously adjusted to remain parallel during operation and not come in contact with the rotor or each other. They should still be in this position. If not aligned properly, adjustment may be made by bending brass lugs.

7. After scanner is reinstalled in organ, pulleys should be adjusted so that the belts turn in one plane, grounding strap #11 is positioned away from contact clips on drum and all ground wires are attached. Scanners should now operate mechanically and electrically quiet. If, after running approximately fifteen minutes, an audible electrical hum exists that was not present before repair procedure, disassemble the rotor and wash it in a solution of detergent and water. Air dry, relubricate, and reassemble according to same procedure. If mechanical or electrical noise persists, return unit for replacement.

EXPRESSION CONTROL

Mysterious Level Changes:

Highly sporadic, fractional second, level increases in any instrument utilizing an LDR Expression Assembly may be caused by a poor connection to the light source lamp or socket.

Remove and inspect the #1866 lamp for cracked end seal or deformed center conductor solder button. Lamp must make firm fit into socket. Sloppy fit allows lamp to flicker when loud passages, notably pedals, are played. This malfunction is especially noticeable in instruments equipped with Rhythm II, due to this drum effect.

Insufficient Expression Control:

It has been brought to our attention that in some cases, lack of expression control in an instrument has been traced to the light diffuser disc in the expression pedal assembly.

Through age or otherwise, the diffuser lens becomes scorched or discolored. When this takes place, the amount of light fed to the Light Dependent Resistor Photo Cell is less than it should be and as a result, the overall expression control is affected.

A good time to check this is when replacement of the expression pedal light bulb becomes necessary. For access to this diffuser lens, the expression pedal has to be disassembled.

SCANNER EXCHANGE, CABLE CONNECTIONS (Serial Numbers Below 15,000)

This information supplements text on page 53D of this service manual.

The early H-100 scanners had 32 plates which terminated in a 17-wire cable. The current replacement scanner has 16 plates which terminate in a 9-wire cable. The new scanner can be used in place of the earlier one by connecting the following wire colors together.

Scanner Wire Color	Wire Color in Console
Brown	Brown
Red	Orange
Orange	Green
Yellow	Violet
Green	White
Blue	White/Brown Tr.
Violet	White/Orange Tr.
Gray	White/Green Tr.
White	White/Violet Tr.

The wires which are left over in the console cable should be pulled back out of the way and taped up, since they are not used.

PEDAL DAMAGE

The problem generally exhibits itself as a little or no top safety on the pedal notes. A possible cause may be the method of movement used when delivering unit to customer or moving from one location to another within your own facilities.

Proper organ dollies should be used to move these instruments. In cases where certain types of piano dollies have been used, the majority of weight of the organ rests upon the pedal switch and pedal angle. The result is an apparent cyphering because the top safety has been lost or reduced due to upward distortion of the pedal switch assembly.

The organ load, when moved properly, should be transmitted to the cabinet end panels.

STRING BASS LATCHING

The following problem has been observed in a few early H-100's, and can occur in any version.

Symptom: After instrument has been "on" for a few minutes, pedal switch solenoids refuse to unlatch immediately, causing two notes to sound at once. In extreme cases, refusal to unlatch will occur with "String Bass" tablets in the "OFF" position.

Use VTVM to monitor pin 6 of P702 on the power supply. Depress "String Bass" tabs and momentarily depress any pedal. Voltage reading should be 18 volts for early models and 14 volts for late instruments.

Continue to monitor Pin 6 of P702 and lift "String Bass" Tablets. Voltage should immediately rise to nearly 32 volts. A slow rise to 32 volts or a reading of more than one volt with any single pedal held down points to excessive leakage current in transistor 01-1205-OP. (Q702 early and late models: Q706 in serial numbers above 15,000).

Insure that insulating washer and silicon grease are applied before installing replacement transistor.

BACKGROUND HUM WHILE PLAYING

The background hum that is most noticeable when using registrations without the 16' harmonic is caused by an interaction of pick-up magnets.

This can be reduced considerably by making the following modifications in the generator.

Refer to the schematic below, capacitor C1 and 1000 ohms resistor should be installed in series with the filter transformer secondary to act as high pass filters. The resistors prevent accumulation of D.C. potential at the generator output. See chart below for proper capacity of C1.

Frequency	Capacitance
49 50 51	10 uf
52 53 54	9 uf
55 56 57	8 uf
58 59 60	7 uf
61 62 63	5 uf
64 65 66	5 uf
67 68 69	4 uf
70 71 72	4 uf
73 74 75	3 uf
76 77 78	3 uf
79 80 81	2 uf
82 83 84	2 uf
85	1 uf

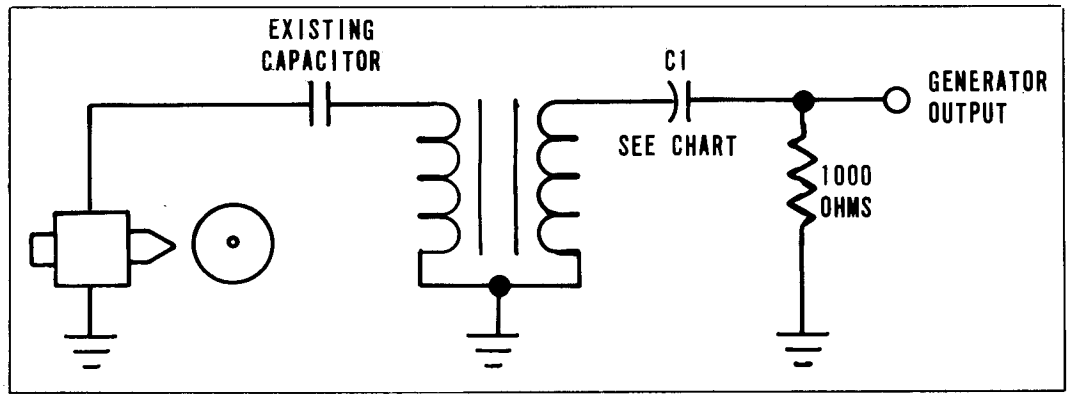


FIGURE 66

TONE CABINET LEVEL SET AID

Level settings for this instrument require the use of a 47K resistor as a load across the tone cabinet outlet terminals, to simulate the actual cabinet. The load resistor is to be placed across the input terminals of the A.C. VTVM with which the measurements are to be made. Unfortunately, several meter manufacturers use screw-on microphone type connectors at the meter end of the probe's cable, which precludes any such arrangements.

To solve this problem, obtain an Amphenol #86-PM711 (or equivalent) plug assembly. Drill out pins 2 and 6 so that the guide pins of the Tone Cabinet outlet will fit through. Two 47K, ½ watt, resistors are then fitted to the rear of the plug (pictorial).

Attach three color coded wires, complete with mini-gator clips and insulating sleeves, and thread through the hole in the snap-on plug shell. The shell acts to protect the wiring and as a handle to ease insertion and removal of the adapter (See Figure 67).

LEVEL SETTINGS (H-300)

NOTE: The set-up conditions are identical to those described in the H-100 set-up chart. Only the output levels mentioned below differ.

1. Channel A and B – Output levels to be set at 700 Millivolts (.7 Volts).
2. Vibrato – Set level at .7 Volts.
3. Tone Setting – Turn control fully clockwise (maximum).
4. Bass Setting – Set to 1.5 Volts (same as H-100 Series).

AUTO RHYTHM (FR2S) COW BELL CYPHER

This effect can be corrected as follows without an oscilloscope by slightly adjusting one or two potentiometers in the rhythm unit.

1. Remove console top assembly (including music rack, rhythm unit, and light assembly) from console by removing two (2) Hex screws, disconnecting ground wire, and disconnecting light plug and rhythm plug.
2. Lay top assembly up-side-down and remove four (4) Phillips head screws from underside of light rail.
3. Slip off the black light housing.
4. Pull off the two rhythm knobs.
5. Remove seven (7) Hex head screws (only three (3) on later models) from the surface below the row of lamps.
6. Remove four (4) Hex head screws securing rhythm unit to underside of top cover.
7. Lift out rhythm unit and remove cover.
8. Reconnect rhythm unit to console (insert rhythm plug and connect ground wire).
9. Depress the Cha-Cha rhythm button.
10. Slightly adjust potentiometer VR8 adjacent to inductor L5 and/or potentiometer VR9 adjacent to inductor L7 on the instrument generator board (see Figure 75) to eliminate the sustained whistle, being careful not to make too great an adjustment such that the cow bell sound is inaudible.

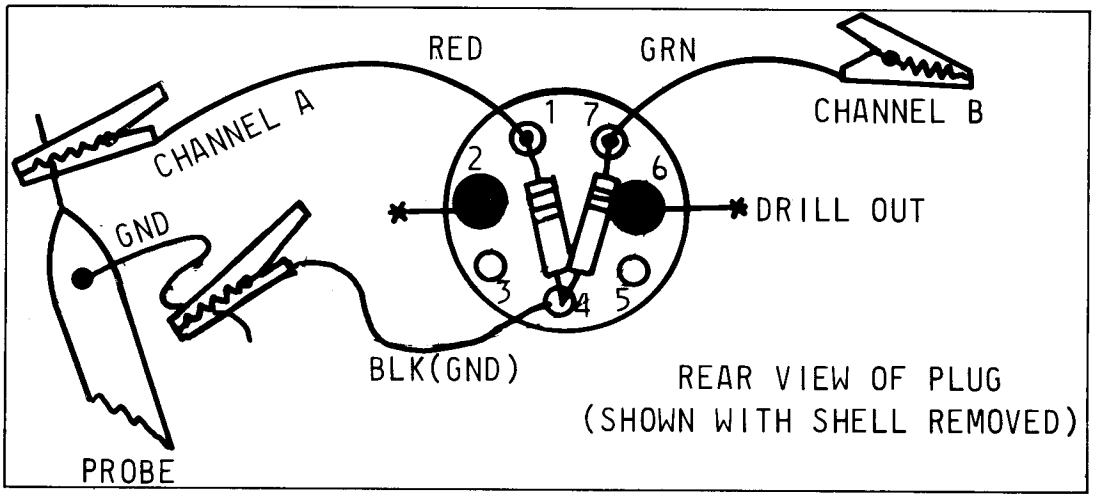


FIGURE 67

11. Replace cover, and reinstall the rhythm unit into the console top and reconnect to the console.

SPORADIC CRACKLING NOISE (H-100) BELOW 15,000 SERIAL NUMBER

Crackling noise in Channel A, B and/or Bass Channel, which occurs occasionally during warm-up, while operating, or at turn-off, may be caused by defective decoupling capacitors in the 7199 stages of the Power Amplifier (AO-70-1)

These capacitors C-332, C-350, and C-366. They are non-polarized types, rated at 20 mfd/50 V.

It is assumed that tube replacement has been tried, and that the instrument will be left "On" during the following tests.

In most cases the faulty capacitor can be detected by allowing the instrument to fully warm up, then removing the 7199 associated with the troublesome channel. Allow the tube to cool for about 10 seconds. If "turn on" or "operating" noise is the symptom, you should hear the crackling upon reinsertion of the tube.

If "warm-up" noise is the problem, remove the 7199 from the noisy channel and allow it to cool completely before reinserting into the socket, or use a fresh known good tube. Run through the applicable test about at least twice to be sure of your diagnosis, then replace all three capacitors to avoid repeat calls.

The capacitors may be replaced by non-polarized local purchase items or from Hammond Organ Company (part number 407-080229) or by standard polarized types which are more readily available. Observe polarity when polarized replacements are installed.

NOISE REDUCTION (H-100, 200, 300)

The following listings contained changes which have been incorporated in Production and may be used in the field to accomplish lower noise level in the H-series organs. The component to be installed in each case is low noise transistor, 001-021260 (commercial #TZ-81 or 2N5826).

ASSEMBLY	CHANGE DESCRIPTION
Pedal Gate Amp (117-000004)	Q154-001-021260 was 001-021070
Percussion Gate Amp	Q101, 103, 104 - 001-021260 was 001-021070
Harp Sustain Keyer Preamp.	Q521 - 001-021260 was 001-021133
Non-Vibrato Preamp.	Q801 - 001-021260 was 001-021090
Vibrato Drive Amp	Q803 - 001-021260 was 001-021133

CIRCUIT BREAKER PROTECTION
Serial Number 15,000 and up (See Figure 52)

A few organs were shipped with a jumper from pin 5 of P701 to pin 6 of P701 inside the power supply. This jumper must be removed to assure proper operation of the circuit breaker.

To ascertain whether a particular organ has the jumper, proceed according to the following:

With power "off", remove one of the clip leads from the circuit breaker. Restore power. If amplifier and power supply filaments glow, jumper is present.

POWER SUPPLY H-100 (Figure 52)

In order to accommodate a change in the windings of pedal latching solenoids in recent production, the value of R722 and R723 have been interchanged. R-722 is now 22 ohms, R-723 is now 18 ohms. Wattage remains unchanged.

PEDAL GATE AMPLIFIER (117-000004)

In October of 1970 a new cable assembly (011-044362) was incorporated in the assembly of the Pedal Gate Amp.

PERCUSSION GATE AMPLIFIER (117-000001)

In November of 1970, a new cable assembly (011-044360) was incorporated in the assembly of the Percussion Gate Amplifier.

H-100 RETRO KIT INSTALLATION (103-000356)

Instructions for installation of a Drum Scanner Kit on the H-100 organ, and a pictorial for the proper component location are presented as Figures 79 and 80.

New circuit above 15000

NEW CIRCUITS
SERIAL NO. 15000 AND UP

Following is a functional list of new circuit assemblies, their assembly numbers and, where applicable, the number of the assembly replaced.

NOTE:

Parts listed below are not interchangeable between earlier H-100 Series organs and those above Serial No. 15000.

	New Assembly No.	Replaces Assembly No.
Power supply	127-000025	127-000017
Vibrato Scanner Assembly	121-000067	121-000096
Pedal Gate Amplifier	117-000004	P/O 126-000039 (AO-72-0)
Percussion Gate and Amplifier	117-000001	P/O 126-000039 (AO-72-0)
Audio Delay Circuit	124-000019	
Percussion & Reiteration Driver	128-000001	125-000029 (AO-30223-0)
Power Amplifier	126-000050	126-000038 (AO-70-1)
Vibrato Recovery Amplifier	124-000100	

THEORY OF OPERATION - NEW CIRCUITS

SOLENOID LATCHING CIRCUIT P/O 127-000025
(Schematic Fig. 52)

Transistor Q706 is a constant current supply providing 130 mA. d. c. for one pedal latching solenoid. The current is set to 130 mA by adjusting control R724 and in this way varying the impedance of transistor Q706.

When another solenoid is switched in parallel to the first one, the current divides equally between both solenoids and each one is drawing 65 mA. Because of tolerances, 65 mA per solenoid may be sufficient to keep both solenoids latched. It is necessary to release the first solenoid when another one is connected. To achieve this, the voltage level at the collector of transistor Q706 is sensed by transistor Q701. When one solenoid is connected, transistor Q701 is conducting and transistor Q702 is cut off.

When the second solenoid is connected, this condition is reversed. The resulting voltage drop at the collector of transistor Q706 causes transistor Q701 to cut off, and this in turn causes transistor Q702 to conduct. The produced voltage change at the collector of Q702 is amplified by transistors Q703 and Q704 and causes the impedance of transistor Q705 to increase. The voltage drop across resistor R722 increases, and this limits the current that transistor Q706 can now pass to 100 mA. The result is 50mA for each solenoid, which is insufficient for latching, and the solenoid which is not held down by an external force (pedal) will release.

PEDAL GATE AMPLIFIER 117-000004
(Schematic Fig. 46)

The purpose of this amplifier is to provide the pedal sustain effect in conjunction with the solenoid controlled pedal switch. It also provides amplification with or without the sustain effect.

NOTE:

Because the "string bass" tabs introduce a "sustain" or "automatic pedal legato" mode in which a pedal note fades away after the pedal is released, it is necessary to have the signal contacts of the last played pedal remain closed. This is accomplished by a solenoid under each pedal which is electrically held down through a locking contact.

The operation of this amplifier can be described in two parts; the Pedal Gate Driver and the Pedal Gate (the latter formed by transistors Q-151 through Q-155). With no pedal depressed, transistor Q-157 is not conducting because of no bias at the base. Zener diode D-151 is draining current through R-176 and maintains +15V at terminal 14. Condensor C-165 has also charged to +15V from terminal 14 via R-178 only, or R-21, R-22 or R-23 in series, depending on the position of the sustain switch.

The charge in condenser C-165 cannot rise above the +15V level of the Zener diode as this would forward bias diode D-152 and connect zener D-151 in parallel to the condenser. Because the base of Q-158 is forward biased, both transistors Q-158 and Q-159 are conducting with a resultant voltage on pin 1.

Depressing a pedal applies +6V through R-174 to the base of transistor Q-157 driving it into saturation. As a result, condenser C-165 discharges through diode D-152, transistor Q-157, and R-177. The voltage at terminal 1 drops to zero.

With the pedal released, Q-157 stops conducting, zener diode D-151 "fires", and reverse biases diode D-152, and C-165 now starts charging; the rate depending upon the setting of the sustain tabs which determine the resistors in series with the charging path. The voltage level at terminal 1 now rises following the level of C-165.

The audio signal is controlled by the pedal gate and more precisely, by the DC voltage developed across R-181 and available at terminal 1. This voltage is applied through R-181 to F.E.T. gate Q-153. This voltage is adjusted to the cut-off voltage of the F.E.T. used. Under this condition the drain to source resistance of Q-153 does not affect the operation of transistor Q-152.

An audio signal appearing in the secondary of T-151 is fed to the base of transistor Q-152 through R-151, C-152, and transistor Q-151. Q-152 splits the signal into two out-of-phase signals. Because of unequal emitter and collector loads. (R-156 and R-157) the signal across R-157 is much greater than that across R-156. Both signals are mixed and levels adjusted by means of R-159, R-160, R-161, and R-162, so that signal cancellation takes place at point 8. This is the condition when the gate is closed.
When the DC at the gate of Q-153 is removed, the drain to source resistance of Q-153 becomes very small (a few hundred ohms).

This connects C-155 in parallel to R-157 and removes the signal degeneration in R-157. The result is a signal level rise at the collector of Q-152. The signal cancelling described in the prior paragraph is offset and a maximum signal now appears at point 8. The gate is now open for maximum signal output conditions.
As the DC voltage at the gate of Q-153 varies (from pinch-off to zero), the signal output from the gate varies correspondingly.

Transistor Q-154 and Q-155 are conventional amplifiers to raise the output of the gate to proper level. R-164 serves as a pedal level adjustment.

PERCUSSION & REITERATION DRIVER 128-000001
(Schematic Fig. 48)

This unit operates in two modes; percussive and reiterative. Percussive can be "touch control" or legato. Reiteration is controlled by "reiteration" tab.

In the percussive mode in standby condition, transistors Q-201, Q-204, and Q-205 are not conducting, hence their collectors are at +25 volts for the three transistors. The +25V potential is a reverse bias for D-204, which is therefore not conducting. Condenser C-203 is charged to +10.5V via any one of the charge time determinant resistors.

When a key is depressed, the keyer contact applies +6V to terminal 3. The current which charges C-201, passes through R-203 and produces a positive pulse at the base of transistor Q-201. Transistor Q-201 saturates and its collector voltage drops momentarily below one volt. The resulting negative

pulse at the collector of Q-201 discharges condenser C-202. The discharge current of C-202 passes through resistor R-207 and effects a positive pulse at the base of transistor Q-204.

Diode D-202 eliminates a negative pulse at the base of Q-204, which would have resulted from releasing the key.

The positive pulse saturates Q-204 and this in turn saturates Q-205. The collector voltage of Q-205 drops below one volt and D-204 is at forward bias potential. Condenser C-203 discharges momentarily via diode D-204, transistor Q-205, and resistor R-209.

This condition is the starting point of percussion drive ramp signal.

After completion of the discharge pulse, C-203 charges again via one of the charge time determinant resistors.

The dual emitter follower stage, consisting of transistor Q-206 and Q-207, isolates output terminal 9 from the timing condenser C-203.

In the reiterative mode, in standby condition, condenser C-203 is charged to approximately +10.5V via resistors R-211 and R-212.

When a key is depressed, the keyer contact applies +6 volts to terminal 5. A forward bias is thereby placed on transistors Q-202 and Q-203. Q-203 saturates and connects diode D-205 to ground. Diode D-205 "fires" and condenser C-203 discharges through transistor Q-203. C-203 charges again through R-211 and R-212. The charge speed is adjusted by Reiteration Rate Control R-211.

When C-203 is charged to the "firing" voltage of D-205, another discharge follows. This cycling continues as long as a keyer contact is closed. The reiterative pulse is connected through isolation transistors Q-206 and Q-207 to terminal #9.

PERCUSSION GATE AMPLIFIER 117-000001
(Schematic Fig. 47)

A positive DC voltage from R-112 is applied through R-111 to the gate terminal of F.E.T. Q-102. This voltage is adjusted by means of R-112 to the pinch-off voltage of the Q-102 F.E.T. used. Under this condition the drain to source resistance of Q-102 is very high (tens of megohms) and Q-102 does not influence the operation of Q-101.

An audio signal from transformer T-101 is fed via C-101 to the base of transistor Q101. Because of uneqal emitter and collector loads (R-104 and R-105), the signal across R-105 is much greater than across R-104. The signal across R-105 is in phase with the signal at the base of Q-101 and the signal across R-104 is 180° shifted in phase. The signals from the collector and emitter of Q-101 are mixed via R-107 plus R-109, and via R-108 plus R-110 in such a way that they both appear at point 7 in equal level and out of phase. The result is that both signals cancel each other and there is no output from the gate. This is the condition when the gate is closed.

When the DC voltage from the F.E.T. gate Q-102 is removed, the drain to source resistance becomes very small (a few hundred ohms) and this virtually places C-104 in parallel with R-105. The result is that the signal at the collector of Q-101 increases, because C-104 decouples the signal current degeneration in R-105. This, in turn unbalances the signal null point at point 7 and gate has maximum output, or is "open."

A variable DC voltage impressed upon gate Q-102 will cause a variable signal output from the gate.

Transistors Q-103 and Q-104 perform as conventional amplifiers to raise the output from the gate to the proper level. R-113 adjusts the gain of the amplifier as required.

AUDIO DELAY CIRCUIT 124-000019
(Schematic Fig. 53)

With no voltage applied to terminal No. 1, Q-951 is not conducting, since there is no forward bias on its base. Accordingly, the junction of R957 and R958 is at ground potential, and no bias voltage is applied to the gates of FET's Q-952 through Q-955. In this condition, the D-to-S resistance of the FET's is relatively low, and audio signals reaching terminals 3 through 6 are shunted to ground.

When -24 volts is applied to terminal No. 1, C-951 begins to charge, and the potential drop at the top end of R-955 is slowly reduced. When the potential has reached approximately -9 volts, the difference across the Zener, D-952, is about 15 volts. The Zener "fires" or starts conducting, supplying current to the base of Q-951, which starts conducting, and about -12 volts appears at the junction of R-957 and R-958. This voltage exceeds the cut-off voltage of the FET's, and when applied to the gates of Q-952 through Q-955 causes their D-to-S resistance to become very high. Therefore, audio signals reaching terminals 3 through 6 are no longer shunted to ground, and pass to the amplifiers at their input terminals.

When power is removed from terminal No. 1, C-951 discharges. D-951 facilitates the discharge by bypassing R-955, thereby rapidly setting up the gate for another delay cycle. The function of C-952 is to inhibit the amplification by Q-951 of noise from D-952. R-956 provides a path for the starting voltage to D-952.

H-300 Series

GENERAL

A new model H-Series organ has been added to the line, designated as Model H-300.

The new model is, in most respects, identical to Model H-100 above serial number 15,000, but is equipped with a built-in Auto Rhythm (125-000054) and new type Drum Scanners.

Only those areas of change will be covered in the following information.

CONTROL PANEL WIRING;

Figure 68 shows changes required in the Control Panel wiring of the organ.

TONE WHEEL GENERATOR ASSEMBLY (113-000016)

The 113-000016 and 113-000005 Tone Wheel Generators are identical except for the mounting frame assembly. The 113-000016 mounting frame is designated for the installation of the Drum Scanner Assembly.

POWER AMPLIFIER ASSEMBLY (126-000069)

The 126-000069 Power Amplifier is identical to the 126-000050 except two capacitors have been changed in value. Refer to Schematic Figure 51A. C-331, 349 have been changed to 100 pf, part number 425-010252.

POWER SUPPLY ASSEMBLY (127-000035)
POWER SUPPLY ASSEMBLY (127-000044) CANADIAN

For Schematic, refer to Figure 69. The 127-000044 Power Supply has six fuses added to comply with C.S.A. standards.

SWELL PEDAL ASSEMBLY (123-000052)

The Swell Pedal on the new model is equipped with a Rhythm Cancel Switch which silences the output of the Auto Rhythm at the organist's will. Figure 70 shows the swell pedal plug connections.

SWELL PEDAL ASSEMBLY (123-000060)

This Swell Pedal is the new building block replacement for 123-000052 above.
Refer to Figure 71 for Swell Pedal Plug Connections, and Figure 72 for layout and wiring.

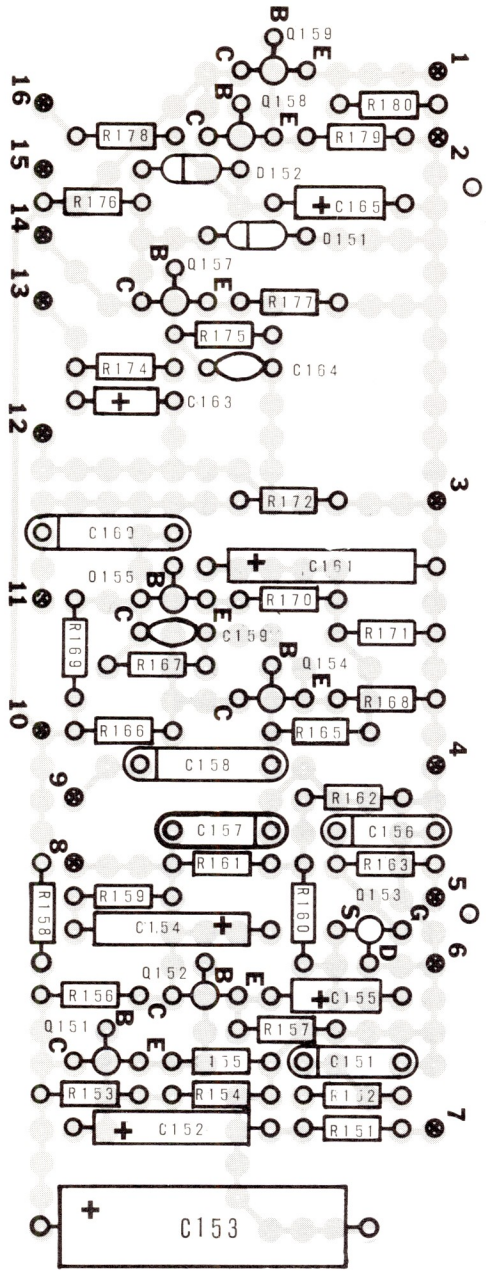
MUSIC ILLUNINATOR

The music illuminator in the new model can be switched "on" independently of the organ circuitry. Figure 73 shows circuitry changes required for this manner of operation. Reference Figure 59, Sheet #3 of this Service Manual.

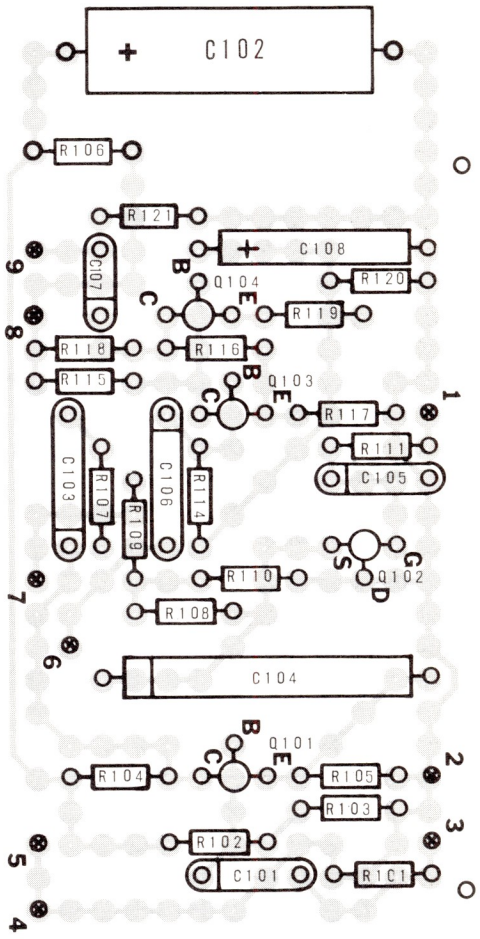
AUTO RHYTHM (125-000054)

The built-in Auto Rhythm is electrically and operationally identical to the product described in the Auto Rhythm Service Manual, HO-871. Figure 74, 75, 76, and 77 are referenced to HO-871, and show the additional circuitry required to build in the unit.

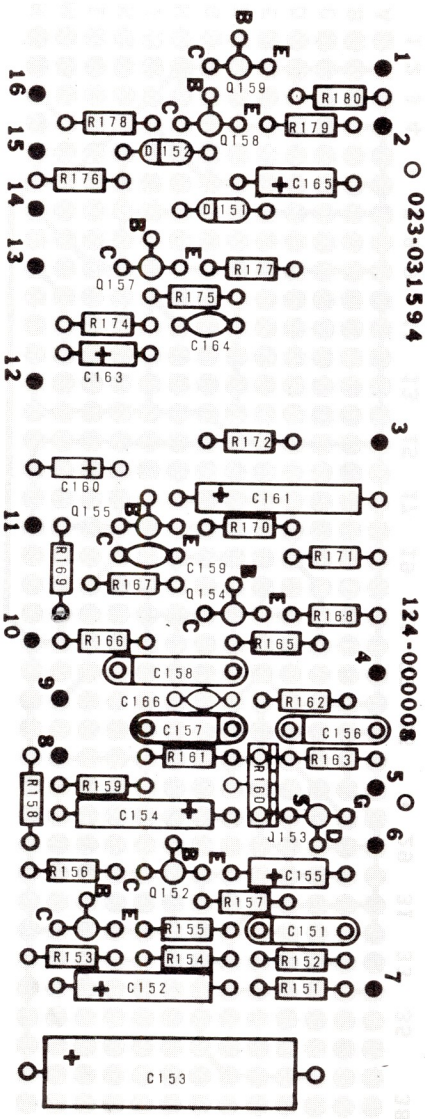
Figure 78, shows plug connections to the built-in Auto Rhythm.



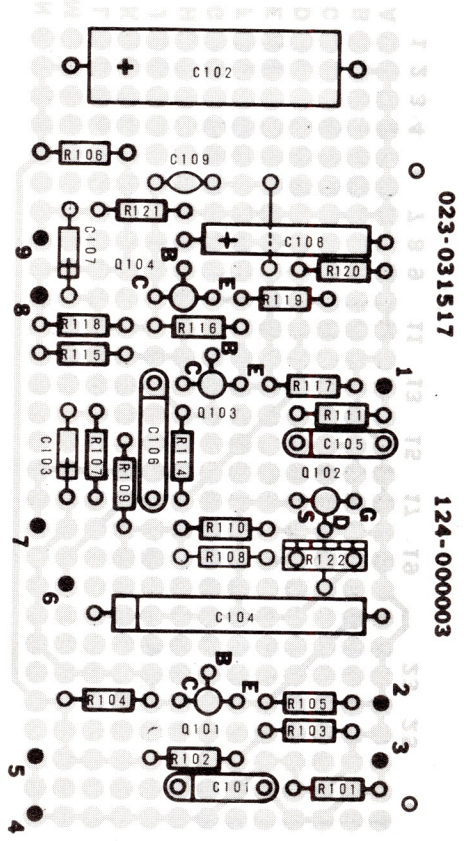
PEDAL GATE P.W.B.
SERIAL NO. 15000 AND UP
124-000008 P/O 117-000004
SCHEMATIC FIGURE 46
FIGURE 36



PERCUSSION GATE P.W.B.
SERIAL NO. 15000 AND UP
124-000003 P/O 117-000001
SCHEMATIC FIGURE 47
FIGURE 37

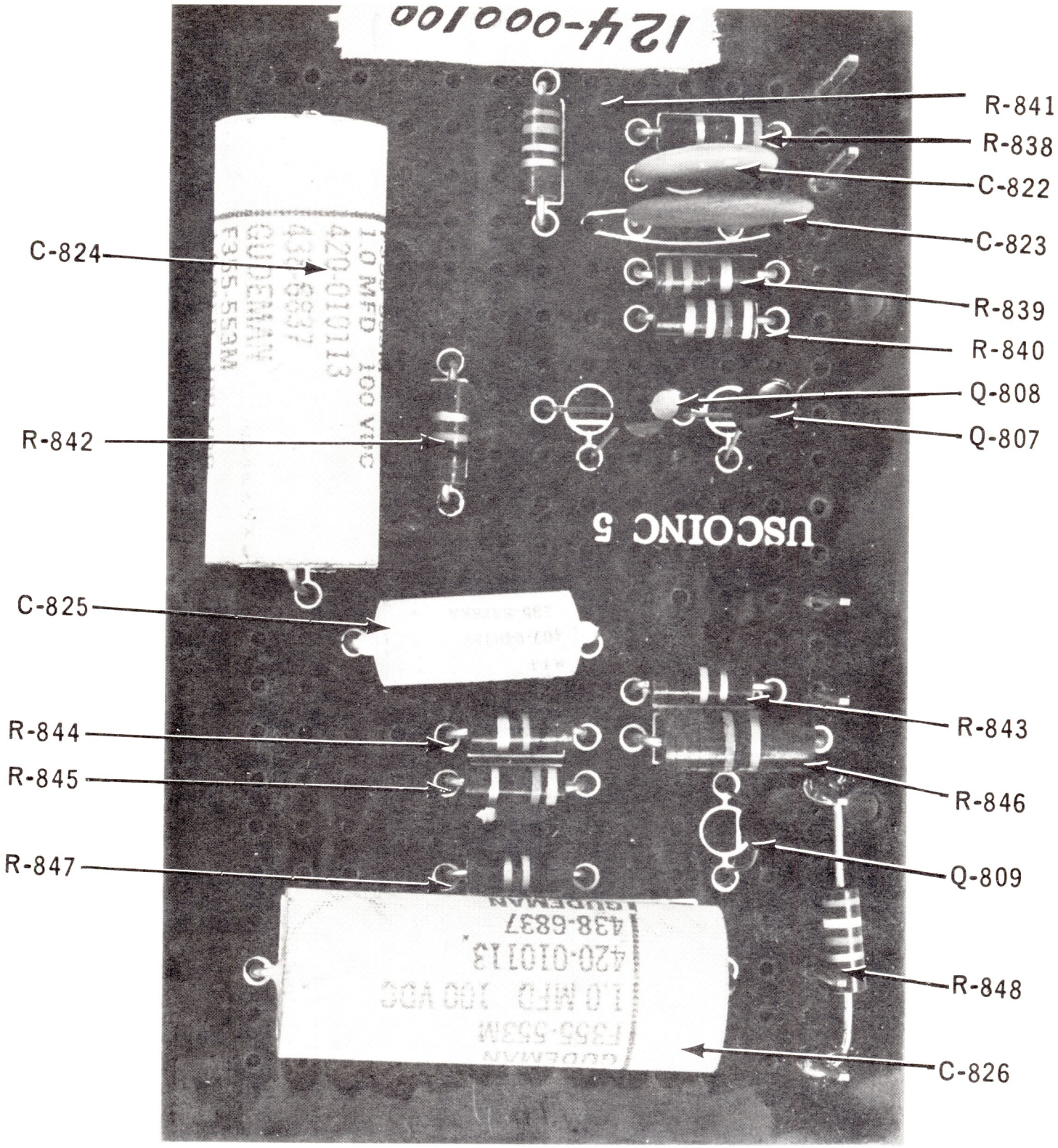


PEDAL GATE P.W.B.
SERIAL NO. 15000 AND UP
124-000008 P/O 117-000004
SCHEMATIC FIGURE 46
FIGURE 36A



PERCUSSION GATE P.W.B.
SERIAL NO. 15000 AND UP
124-000003 P/O 117-000001
SCHEMATIC FIGURE 47
FIGURE 37A

REVISED JULY 1, 1969



VIBRATO RECOVERY AMPLIFIER BOARD
SERIAL NO. 15000 AND UP
SCHEMATIC FIGURE 49
FIGURE 38

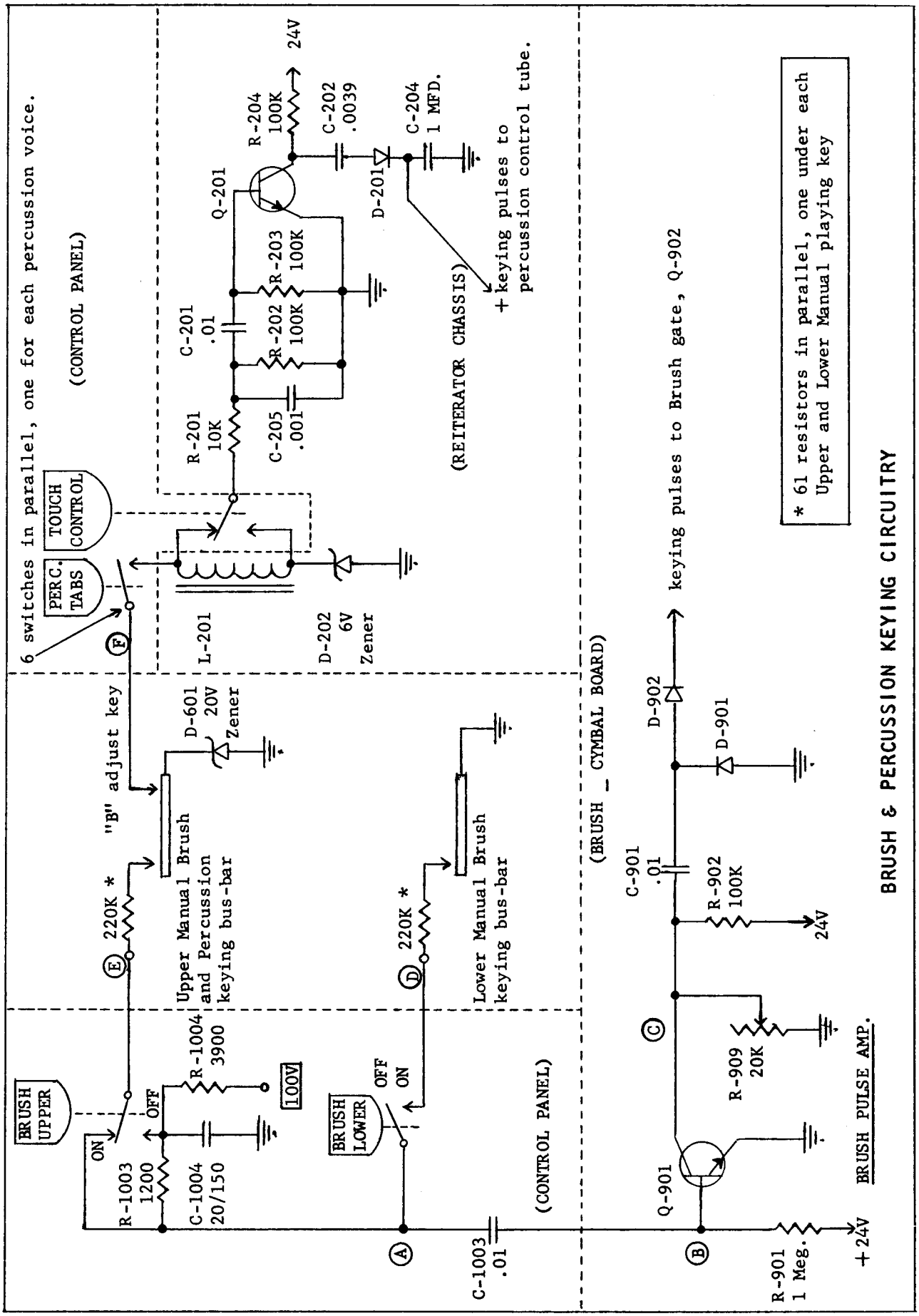
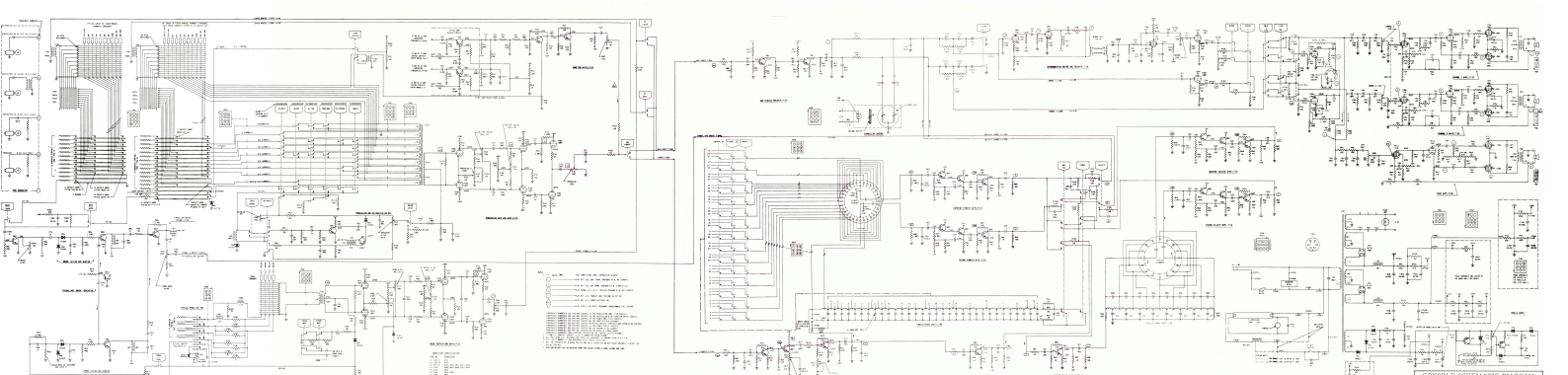
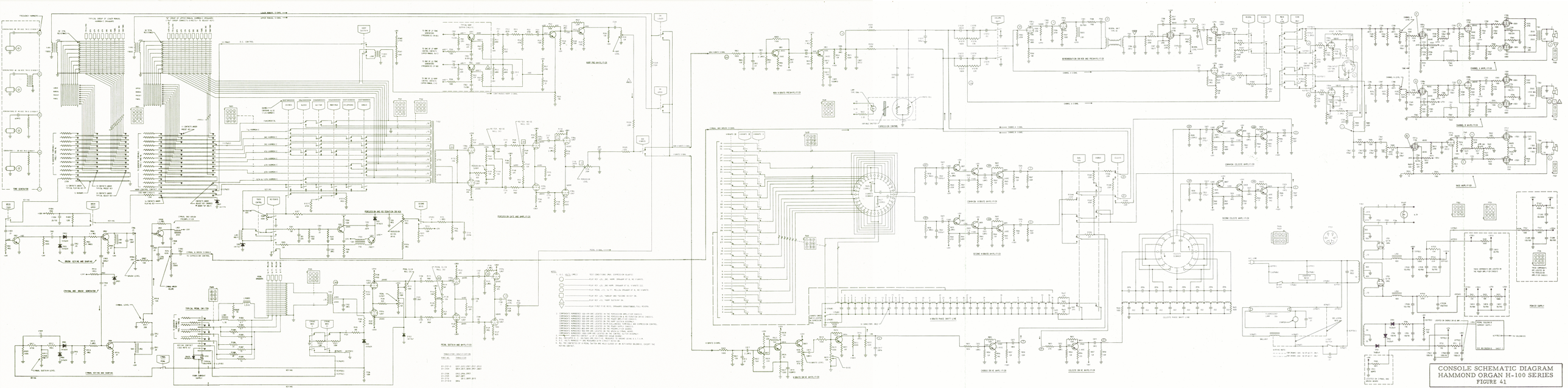

BRUSH & PERCUSSION KEYING CIRCUITRY
6 switches in parallel, one for each percussion voice.
(CONTROL PANEL)
PERC. TABS
TOUCH CONTROL
"B" adjust key
BRUSH UPPER
ON
OFF
R-1003 1200
C-1004 20/150
R-1004 3900
100V
220K *
Upper Manual Brush and Percussion keying bus-bar
D-601 20V Zener
BRUSH LOWER
OFF ON
220K *
Lower Manual Brush keying bus-bar
C-1003 .01
(CONTROL PANEL)
L-201
D-202 6V Zener
C-201 .01
R-201 10K
C-205 .001
R-202 100K
R-203 100K
Q-201
R-204 100K
24V
C-202 .0039
D-201
C-204 1 MFD.
(REITERATOR CHASSIS)
+ keying pulses to percussion control tube.
(BRUSH _ CYMBAL BOARD)
keying pulses to Brush gate, Q-902
D-902
D-901
C-901 .01
R-902 100K
24V
R-909 20K
Q-901
R-901 1 Meg.
+24V
BRUSH PULSE AMP.
* 61 resistors in parallel, one under each Upper and Lower Manual playing key

Figure 39



CONSOLE SCHEMATIC DIAGRAM
HAMMOND ORGAN H-100 SERIES
FIGURE 40



CONSOLE SCHEMATIC DIAGRAM
HAMMOND ORGAN H-100 SERIES
FIGURE 41

On later units this wire moved from bottom of Reiterate Switch to bottom of Touch Control Switch along with red wire.

TO BRUSH AND CYMBAL BOARD

CLIP OFF DRAIN WIRES AND APPLY TAPE WRAP

CLIP OFF SHIELD WIRE

TO HARP AMPLIFIER

TO SCANNER

VIO.	YEL.	BRN.	WHT.
GRA.	GRN.	RED	
WHT.	BLU.	ORN.	
WHT. BLU.	WHT. ORN.	WHT. BLK.	GRN.
WHT. VIO.	WHT. YEL.	WHT. GRN.	
	WHT. GRN.	WHT. RED	

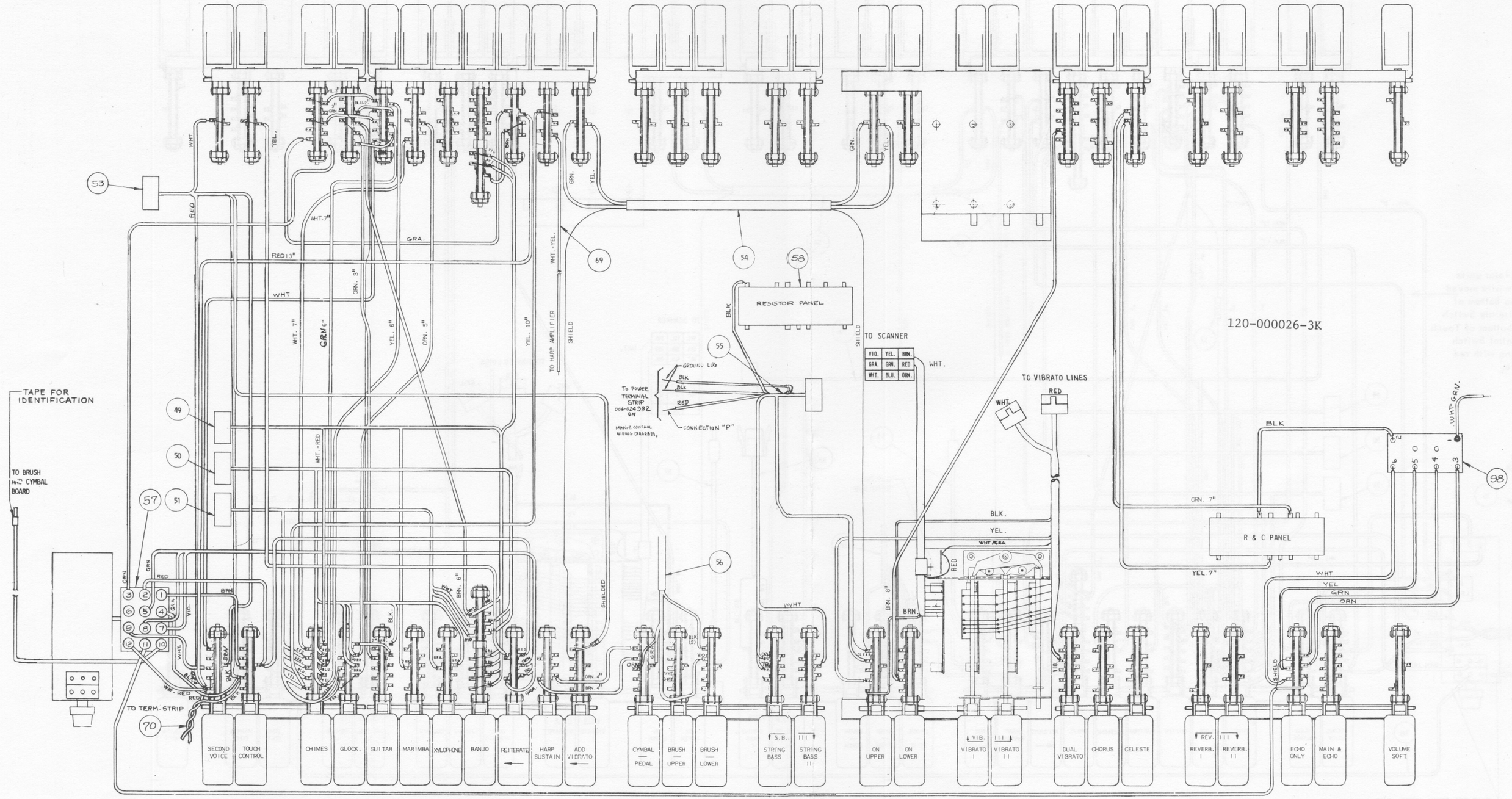
TO VIBRATO LINES

WHT. RED GRN.

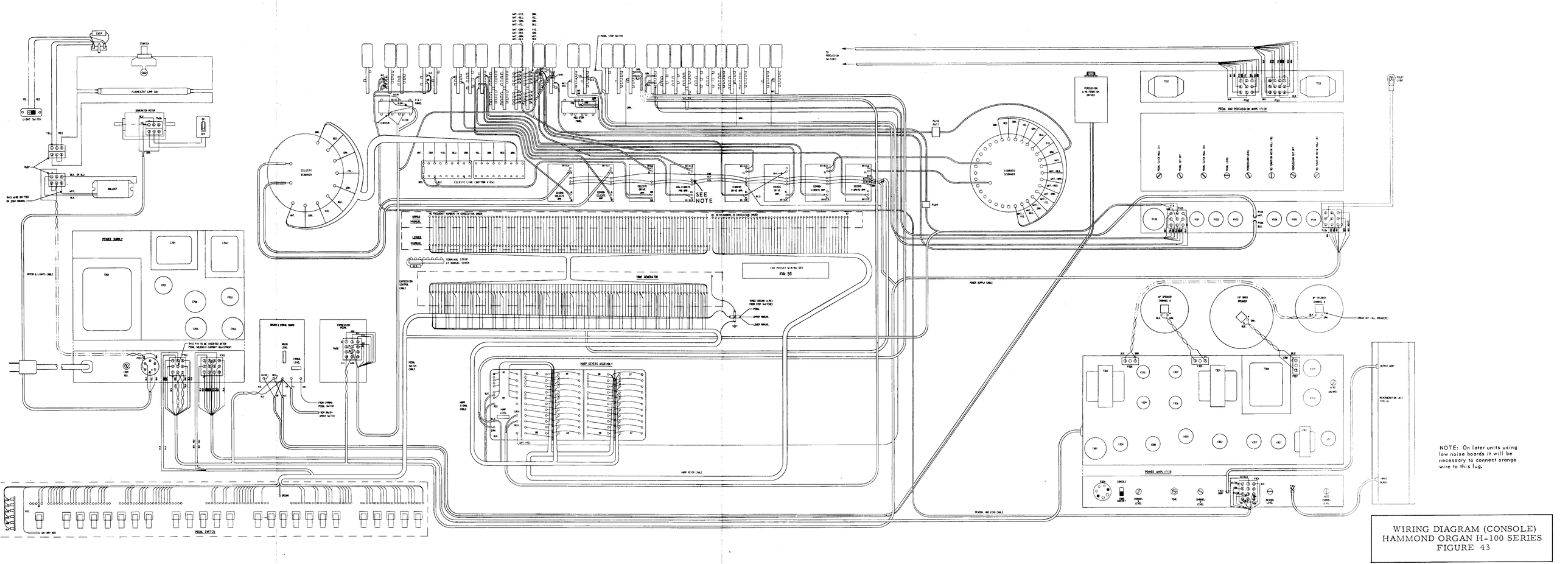
R & C PANEL

SECOND VOICE
TOUCH CONTROL
CHIMES
GLOCK.
GUITAR
MARIMBA
XYLOPHONE
BANJO
REITERATE
HARP SUSTAIN
ADD VIBRATO
CYMBAL — PEDAL
BRUSH — UPPER
BRUSH — LOWER
S.B. III STRING BASS I / STRING BASS II
ON UPPER
ON LOWER
VIB. I / III VIBRATO I / VIBRATO II
DUAL VIBRATO
CHORUS
CELESTE
REV. I / III REVERB. I / REVERB. II
ECHO ONLY
MAIN & ECHO
VOLUME SOFT

CONSOLE CONTROL PANEL WIRING
FIGURE 42

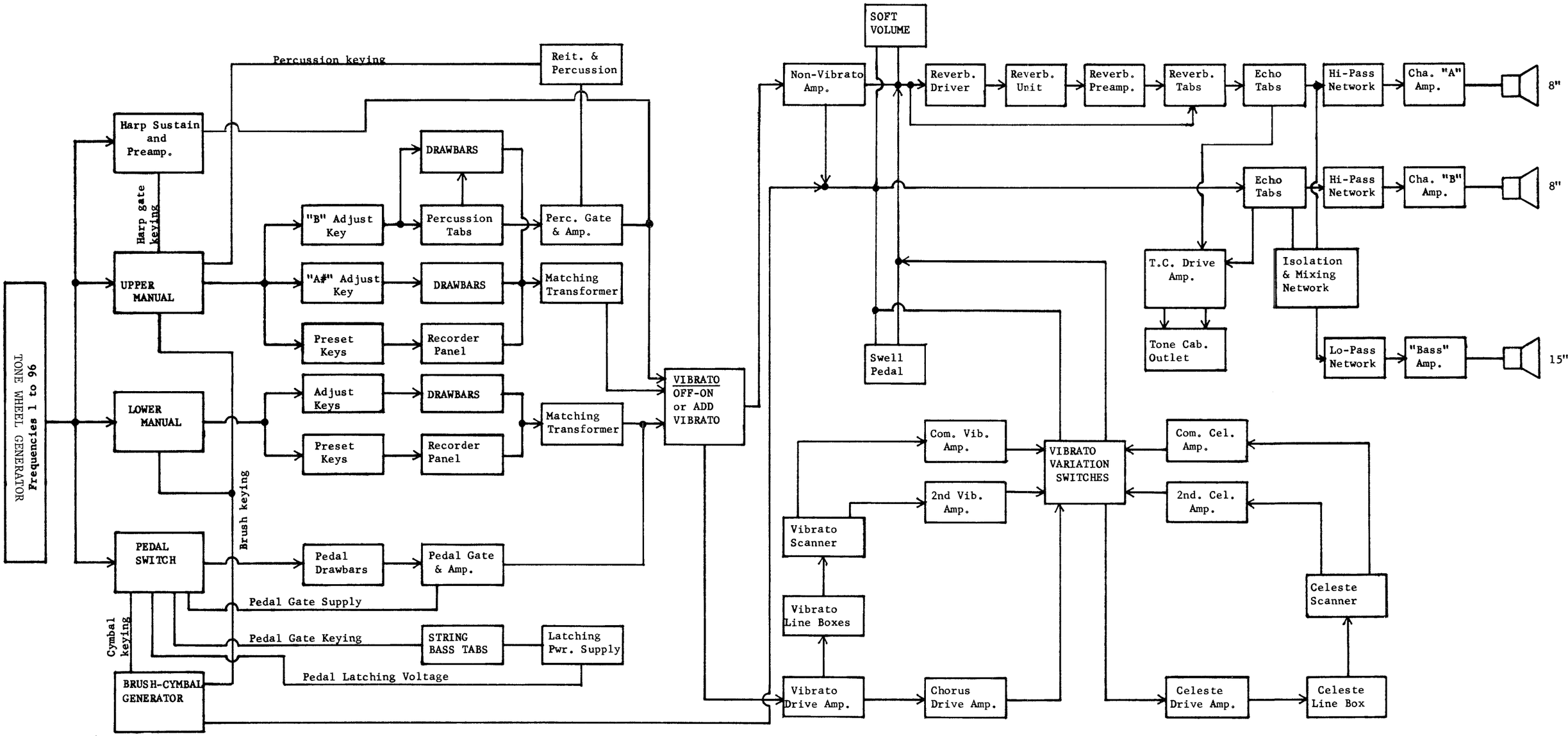


CONSOLE CONTROL PANEL WIRING REVISED FEB. 1969 FIGURE 42A

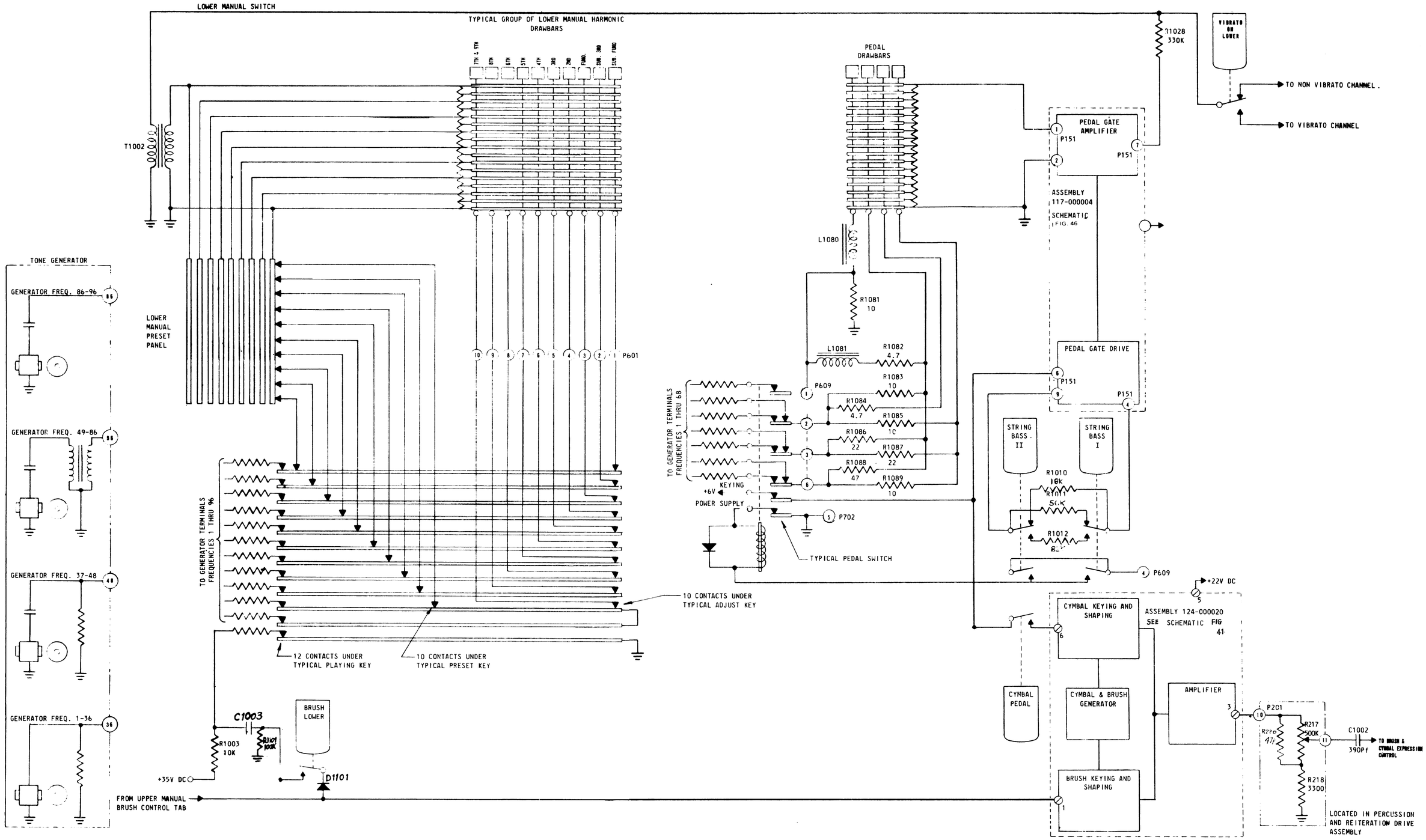


NOTE: On later units using low noise boards it will be necessary to connect orange wire to this lug.

WIRING DIAGRAM (CONSOLE)
HAMMOND ORGAN H-100 SERIES
FIGURE 43



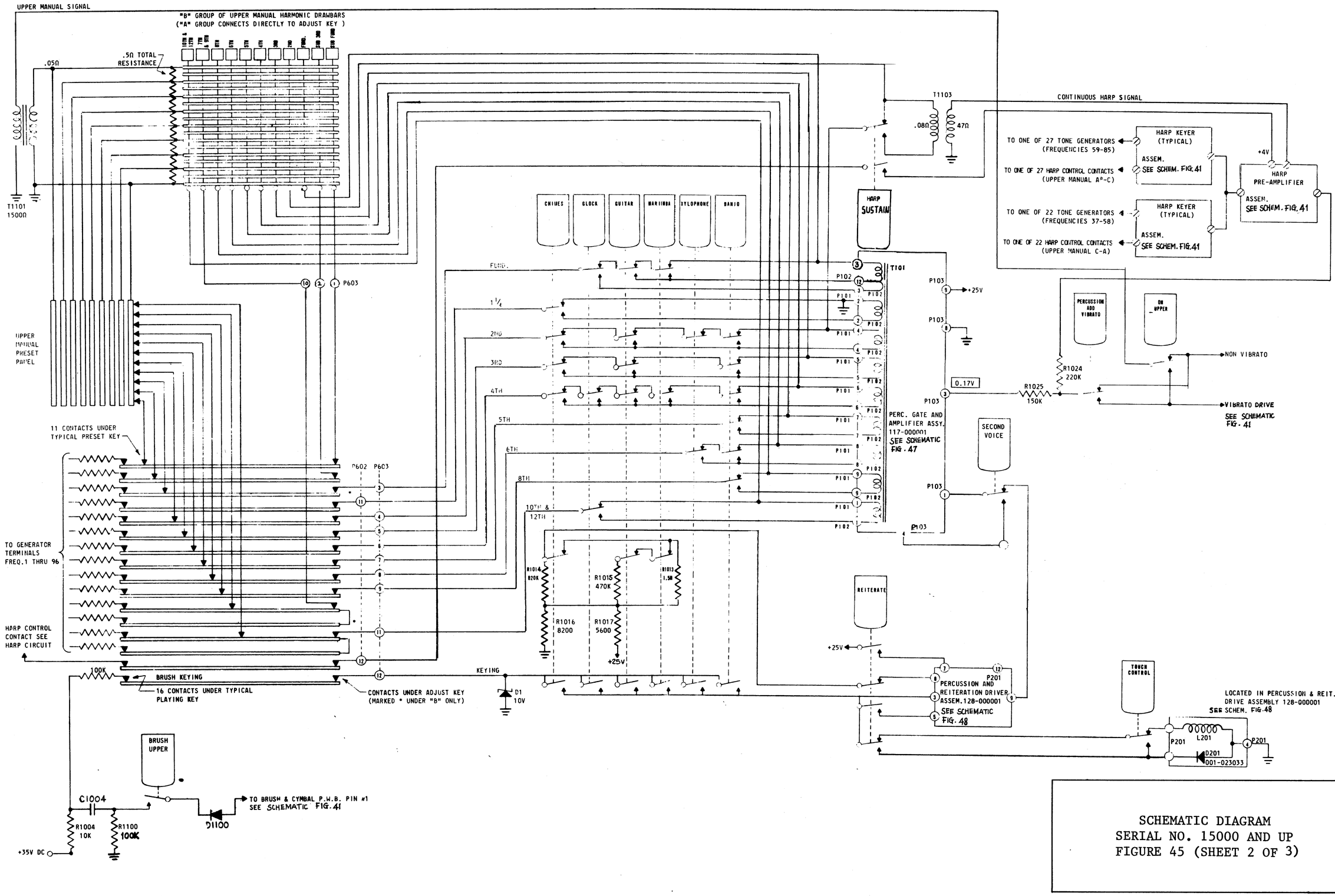
BLOCK DIAGRAM
H-100 SERIES
FIGURE 44



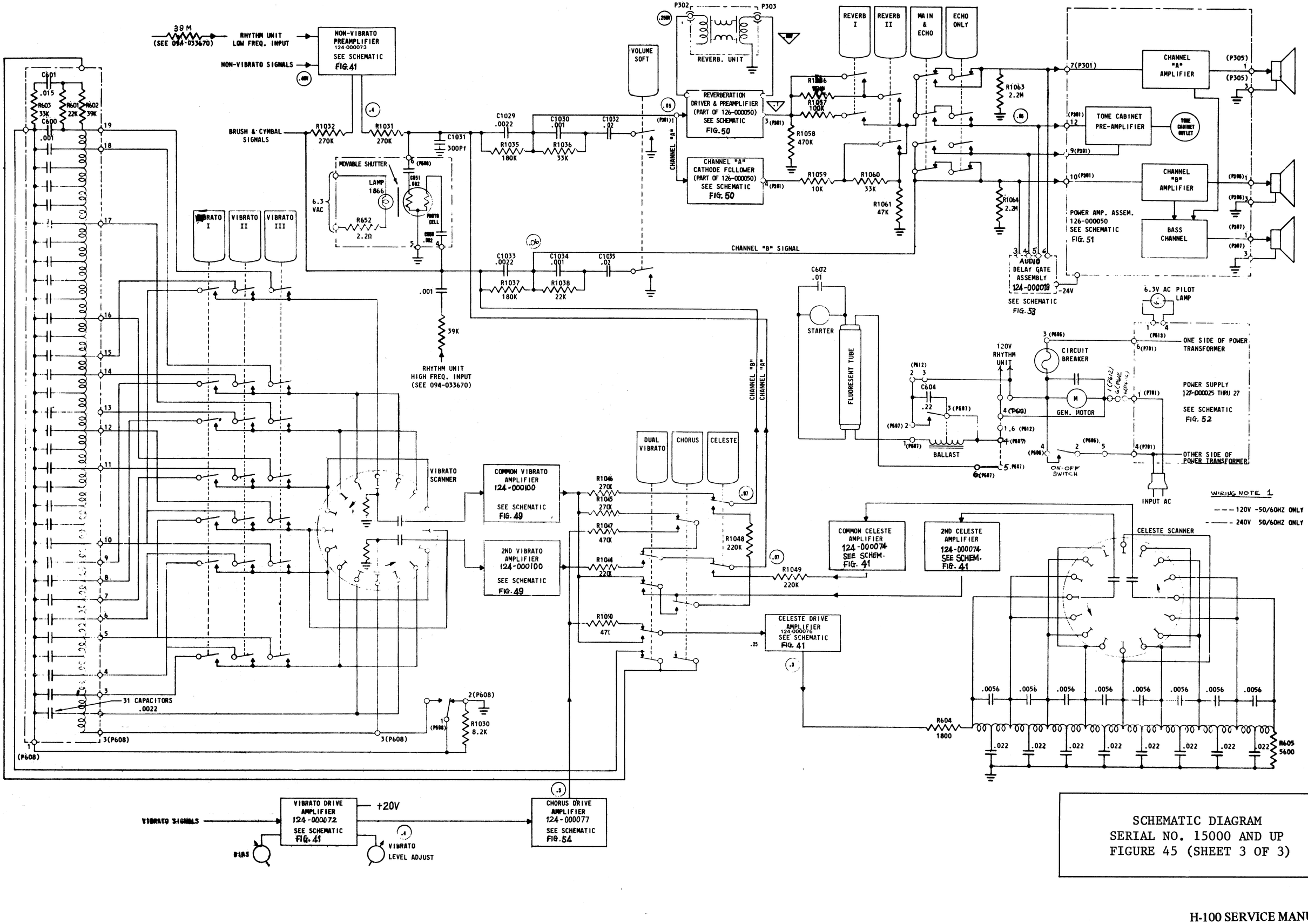
NOTES:

1. COMPONENTS 1000 TO 1199 ARE LOCATED ON CONTROL SWITCH ASSEMBLY.

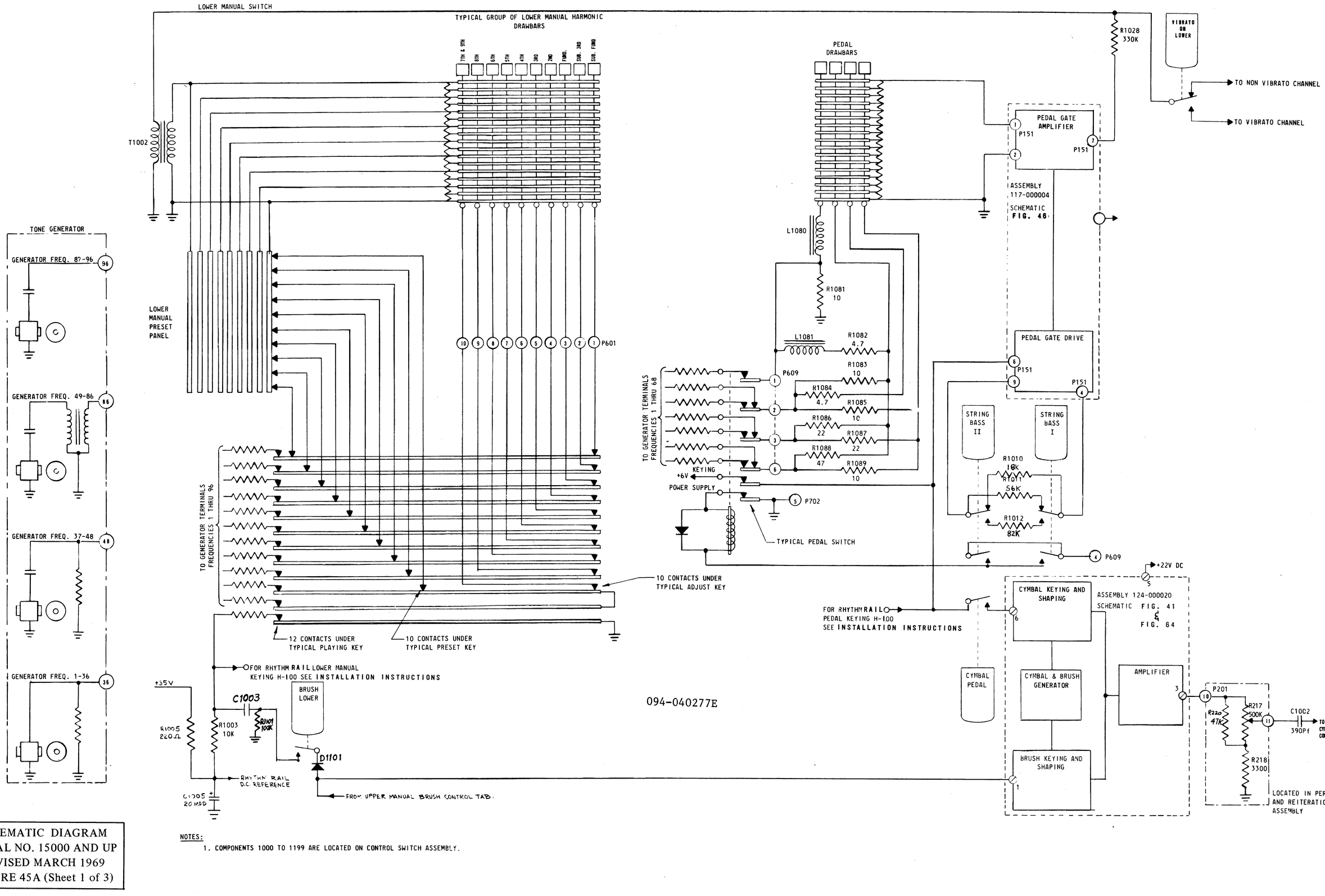
SCHEMATIC DIAGRAM
SERIAL NO. 15000 AND UP
FIGURE 45 (SHEET 1 OF 3)



SCHEMATIC DIAGRAM
SERIAL NO. 15000 AND UP
FIGURE 45 (SHEET 2 OF 3)



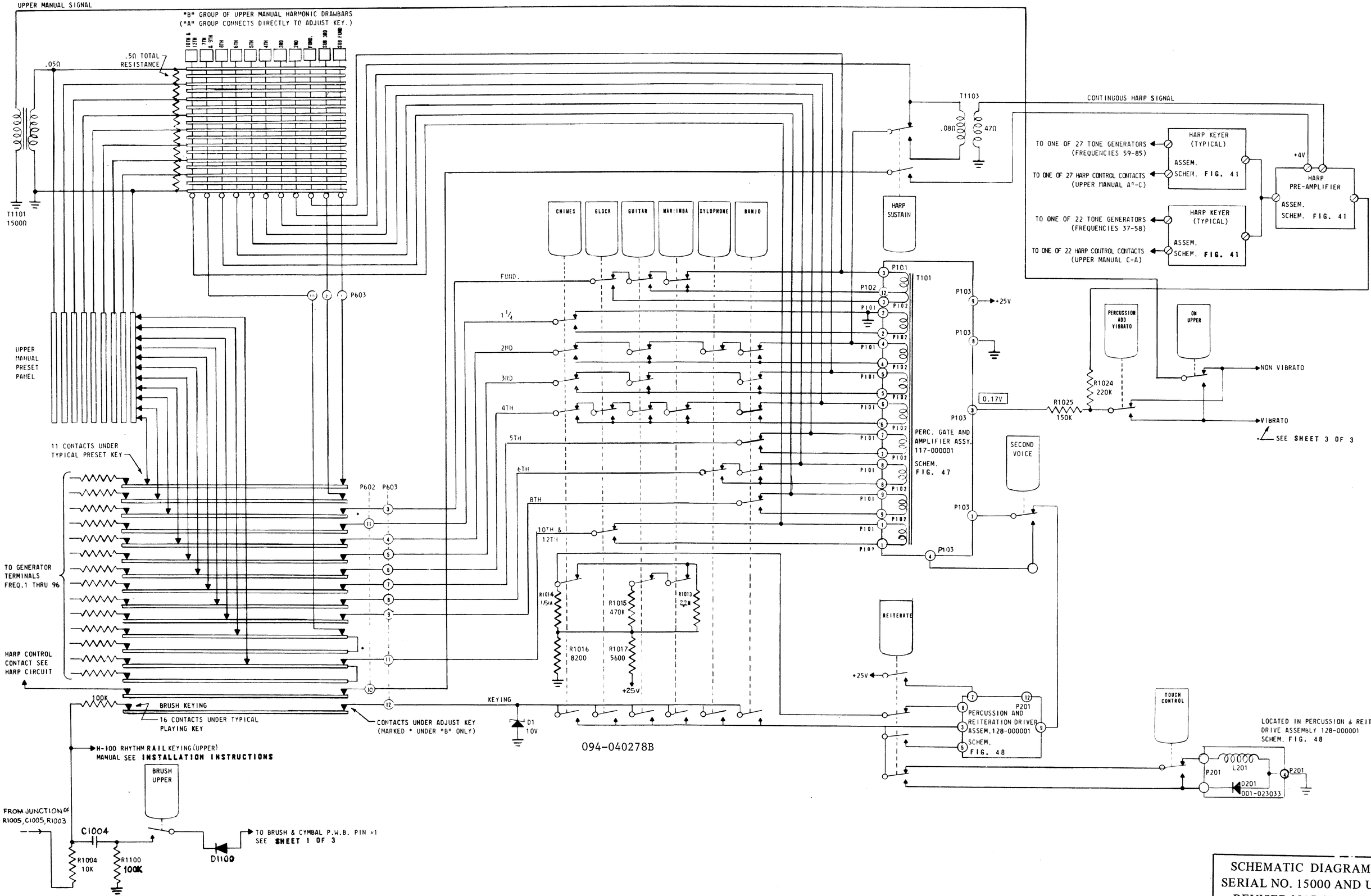
SCHEMATIC DIAGRAM
SERIAL NO. 15000 AND UP
FIGURE 45 (SHEET 3 OF 3)



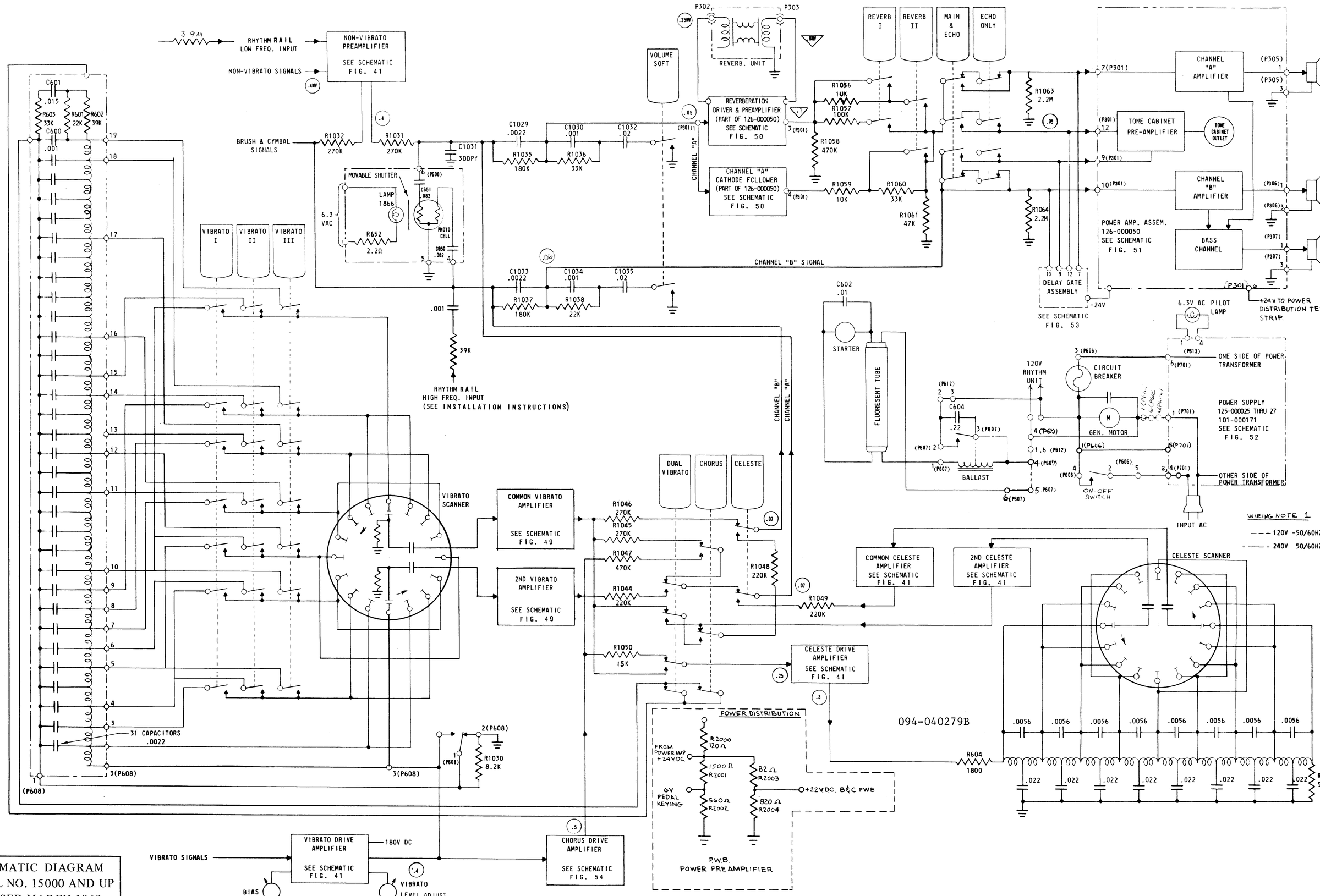
NOTES:

1. COMPONENTS 1000 TO 1199 ARE LOCATED ON CONTROL SWITCH ASSEMBLY.

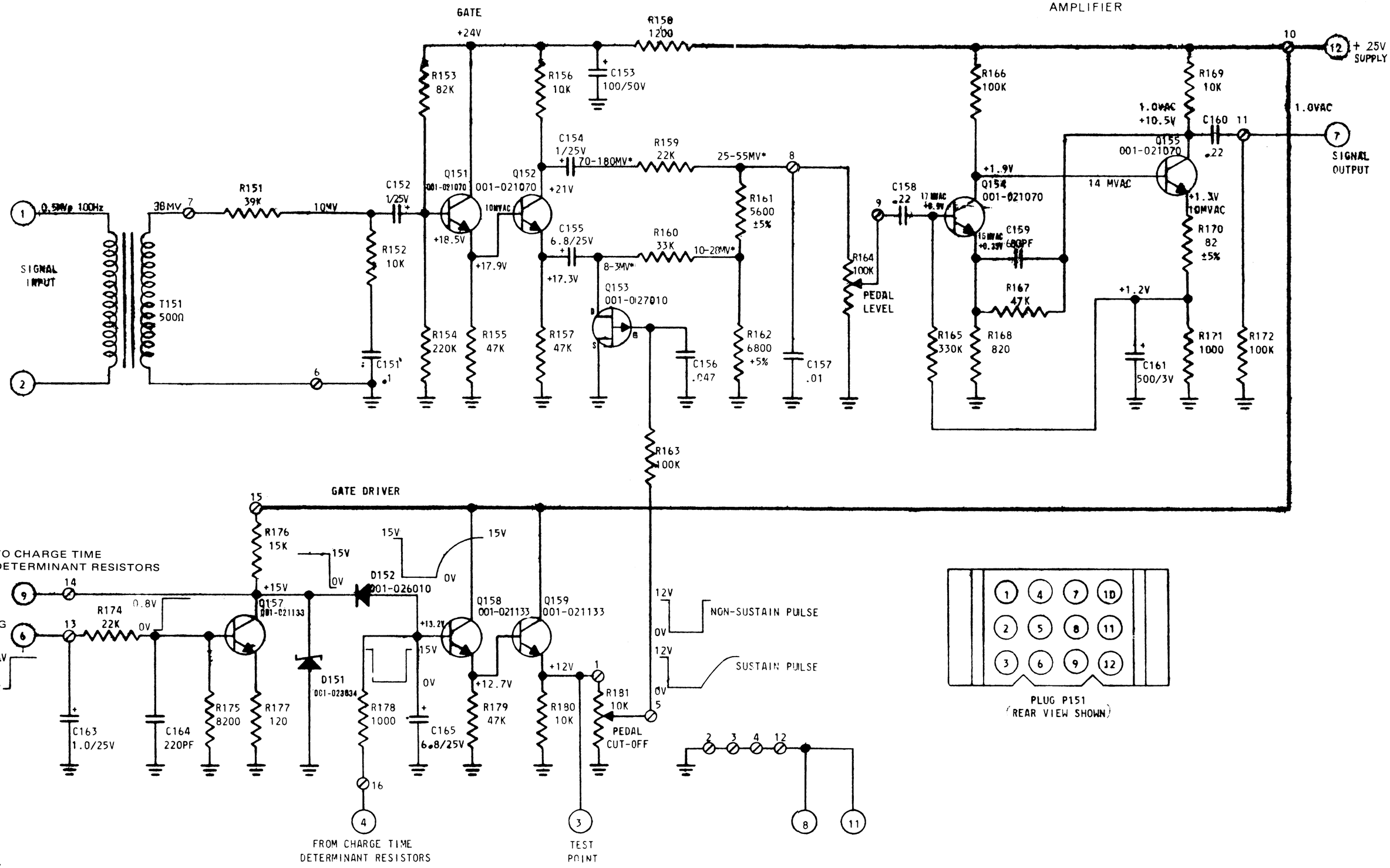
SCHEMATIC DIAGRAM
SERIAL NO. 15000 AND UP
REVISED MARCH 1969
FIGURE 45A (Sheet 1 of 3)



SCHEMATIC DIAGRAM
SERIAL NO. 15000 AND UP
REVISED MARCH 1969
FIGURE 45A (Sheet 2 of 3)



SCHEMATIC DIAGRAM
SERIAL NO. 15000 AND UP
REVISED MARCH 1969
FIGURE 45A (Sheet 3 of 3)



NOTES:

1. (6) SYMBOL DENOTES TERMINAL IN PLUG.
2. ⊘ SYMBOL DENOTES TERMINAL ON PRINTED WIRING BOARD.
3. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS.
4. * AC VOLTAGES DEPEND ON R_{DS} OF Q153 F.E.T.

SCHEMATIC DIAGRAM
PEDAL GATE AMPLIFIER
SERIAL NO. 15000 AND UP
117-000004
FIGURE 46

AMPLIFIER

GATE

+24V

R158
1200

R153
82K

R156
10K

C153
100/50V

R166
100K

R169
10K

C166
100 PF

1.0VAC
+10.5V

C160
1MFD

10

12 +25V SUPPLY

1.0VAC

7 SIGNAL OUTPUT

C154
68/25V

R159
22K

25-55MV*

8

Q155
001-021070

1.9V

17 MVAC

14 MVAC

1 0.5MVc 100Hz

SIGNAL INPUT

35MV

7

R151
39K

10MV

C152
1/25 V

Q151
001-021070

Q152
001-021070

+21V

10MVAC

+18.5V

+17.9V

C155
6.8/25V

R160
100K

10-28MV*

8-34MV*

+17.3V

Q153
001-027010

R161
5600
±5%

R164
100K

PEDAL LEVEL

9

C158
.22

+0.9V

Q154
001-021070

16 MVAC

C159
+0.35V 680PF

+1.3V
10MVAC

R170
82
±5%

R167
47K

+1.2V

R152
10K

T151
500Ω

6

C151
.1

R154
220K

R155
47K

R157
47K

C156
.047

R162
6800
±5%

C157
.01

R165
330K

R168
820

C161
500/3V

R171
1000

R172
100K

2

R163
100K

GATE DRIVER

15

R176
15K

15V

0V

D152
001-026010

15V

15V

0V

TO CHARGE TIME DETERMINANT RESISTORS

9

14

+15V

Q157
001-021133

Q158
001-021133

Q159
001-021133

12V

0V

NON-SUSTAIN PULSE

R174
22K

0-8V

0V

D.C. KEYING VOLTAGE INPUT

6

13

+6V

0V

+13.2V

15V

0V

+12.7V

+12V

1

12V

0V

SUSTAIN PULSE

5

D151
001-023034

R175
8200

R177
120

C163
1.0/25V

C164
220PF

R178
1000

C165
6.8/25V

R179
47K

R180
10K

R181
10K

PEDAL CUT-OFF

2 3 4 12

16

4

FROM CHARGE TIME DETERMINANT RESISTORS

3

TEST POINT

8

11

PLUG P151
(REAR VIEW SHOWN)

1 4 7 10
2 5 8 11
3 6 9 12

NOTES:

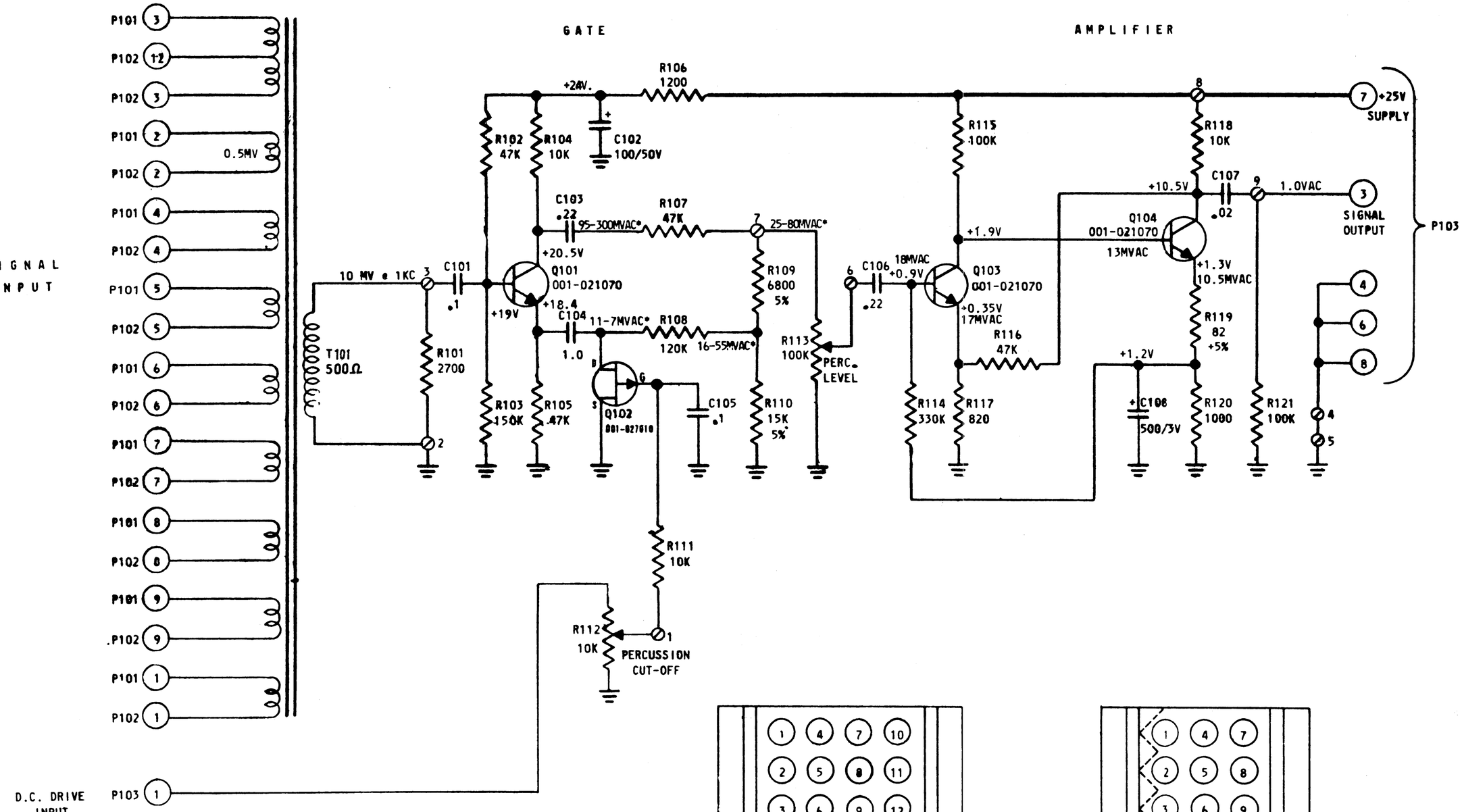
1. (6) SYMBOL DENOTES TERMINAL IN PLUG.
2. ⊘ SYMBOL DENOTES TERMINAL ON PRINTED WIRING BOARD.
3. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS.
4. * AC VOLTAGES DEPEND ON R_{DS} OF Q153 F.E.T.

REVISED JULY 1, 1969

094-034459C

SCHEMATIC DIAGRAM
PEDAL GATE AMPLIFIER 117-000004

FIGURE 46A



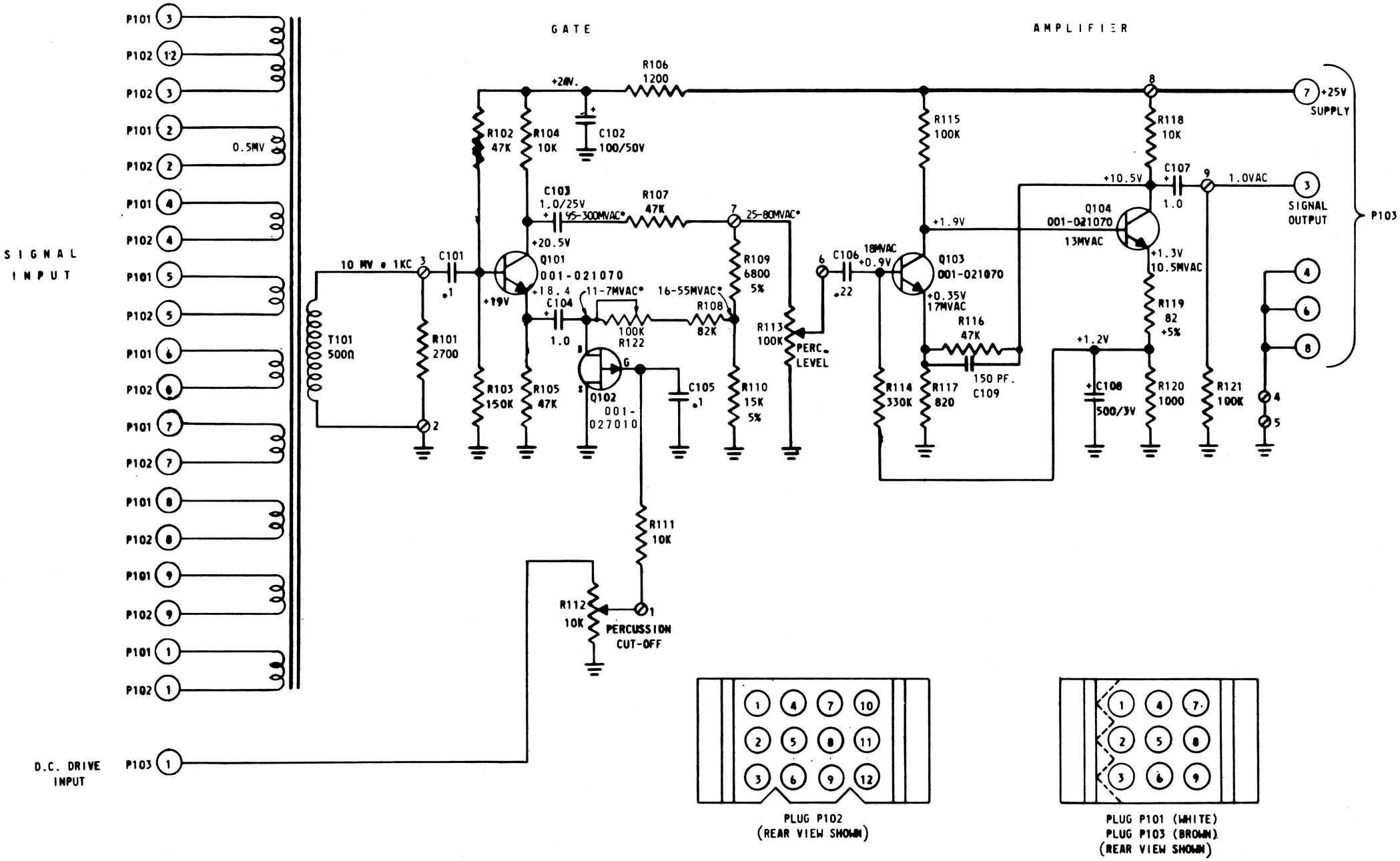
PLUG P102
(REAR VIEW SHOWN)

PLUG P101 (WHITE)
PLUG P103 (BROWN)
(REAR VIEW SHOWN)

NOTES:

1. (3) SYMBOL DENOTES TERMINAL IN PLUG.
2. ⊘ SYMBOL DENOTES TERMINAL ON PRINTED WIRING BOARD.
3. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS
4. *AC VOLTAGES DEPEND ON R_{DS} OF Q 102 F.E.T.

SCHEMATIC DIAGRAM
PERCUSSION GATE AMPLIFIER
SERIAL NO. 15000 AND UP
117-000001
FIGURE 47



NOTES:

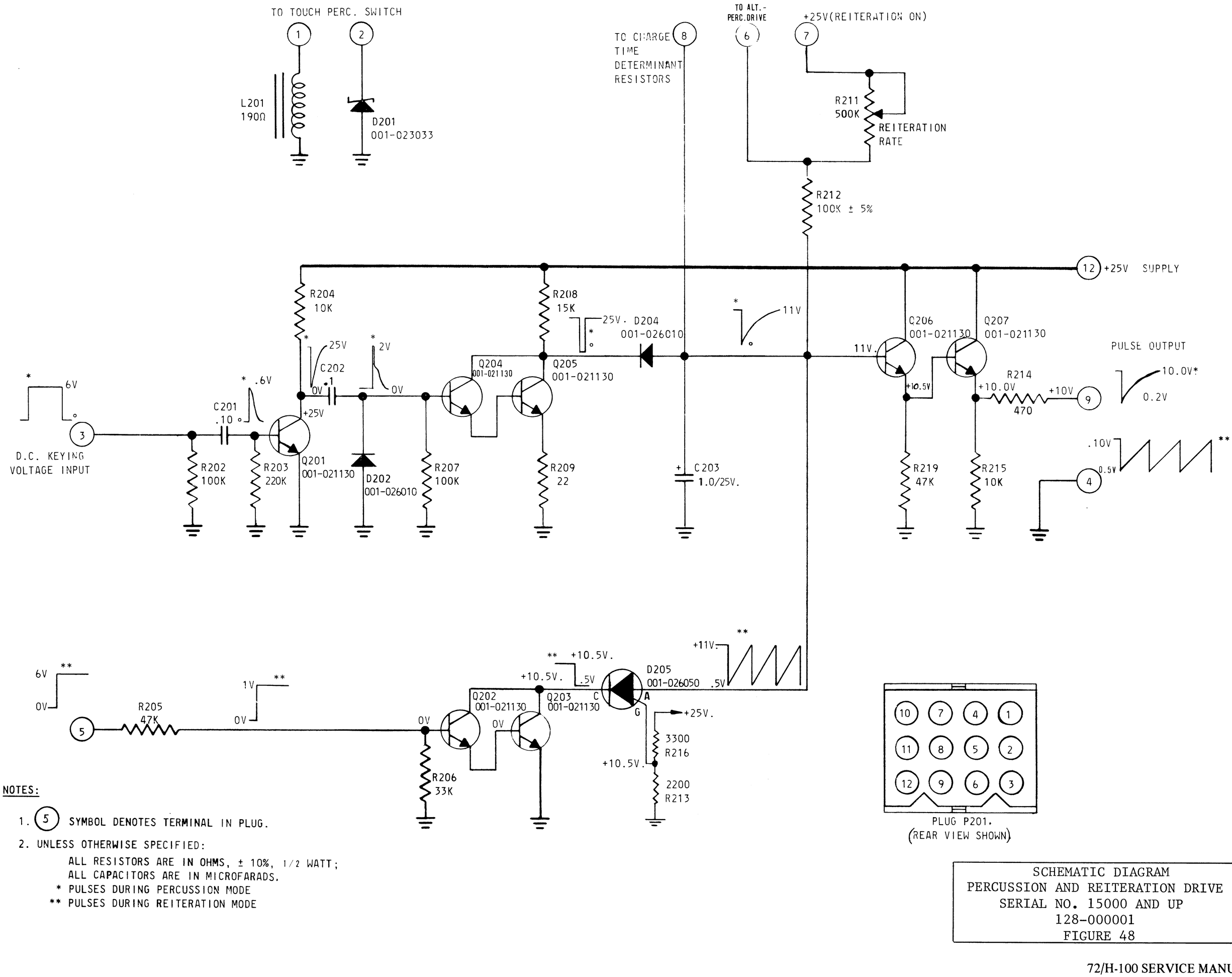
1. (3) SYMBOL DENOTES TERMINAL IN PLUG.
2. ⊘ SYMBOL DENOTES TERMINAL ON PRINTED WIRING BOARD.
3. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS
4. *AC VOLTAGES DEPEND ON R_{DS} OF Q 102 F.E.T.

REVISED JULY 1, 1969

094-034462A

SCHEMATIC DIAGRAM
PERCUSSION GATE AMPLIFIER 117-000001

FIGURE 47A

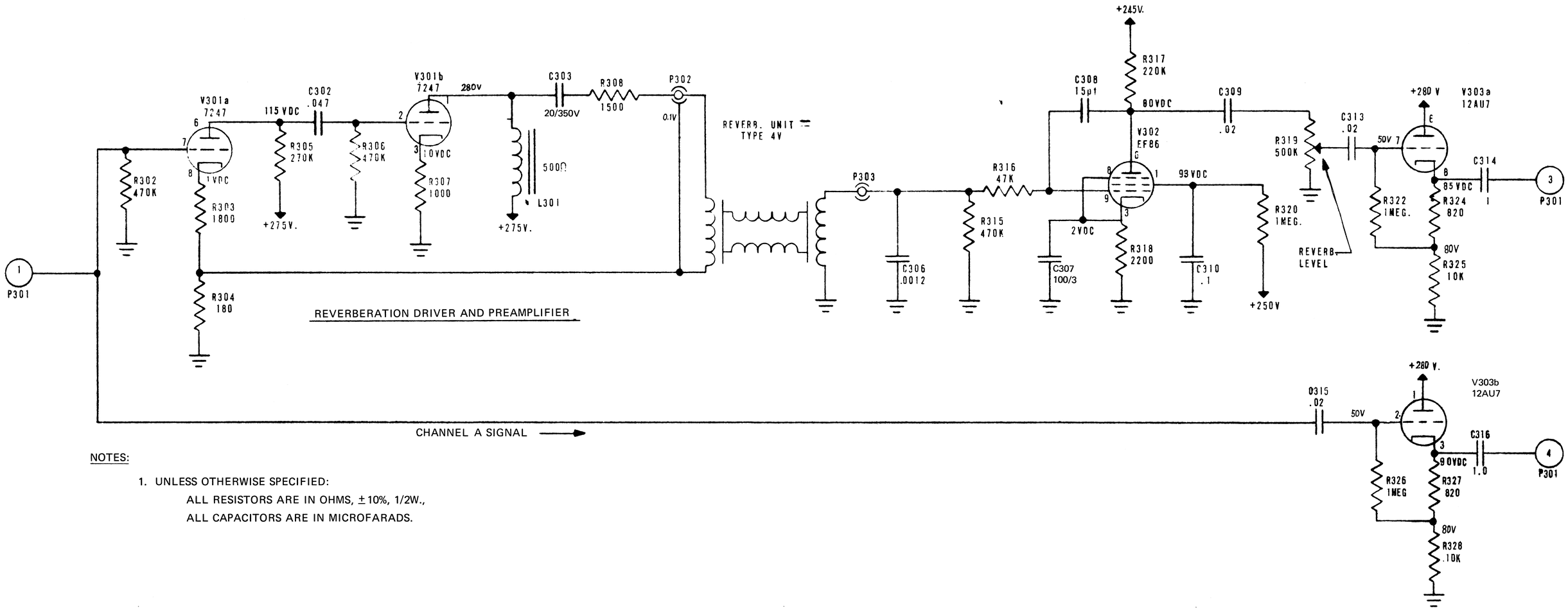


PLUG P201.
(REAR VIEW SHOWN)

NOTES:

1. (5) SYMBOL DENOTES TERMINAL IN PLUG.
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS.
   * PULSES DURING PERCUSSION MODE
   ** PULSES DURING REITERATION MODE

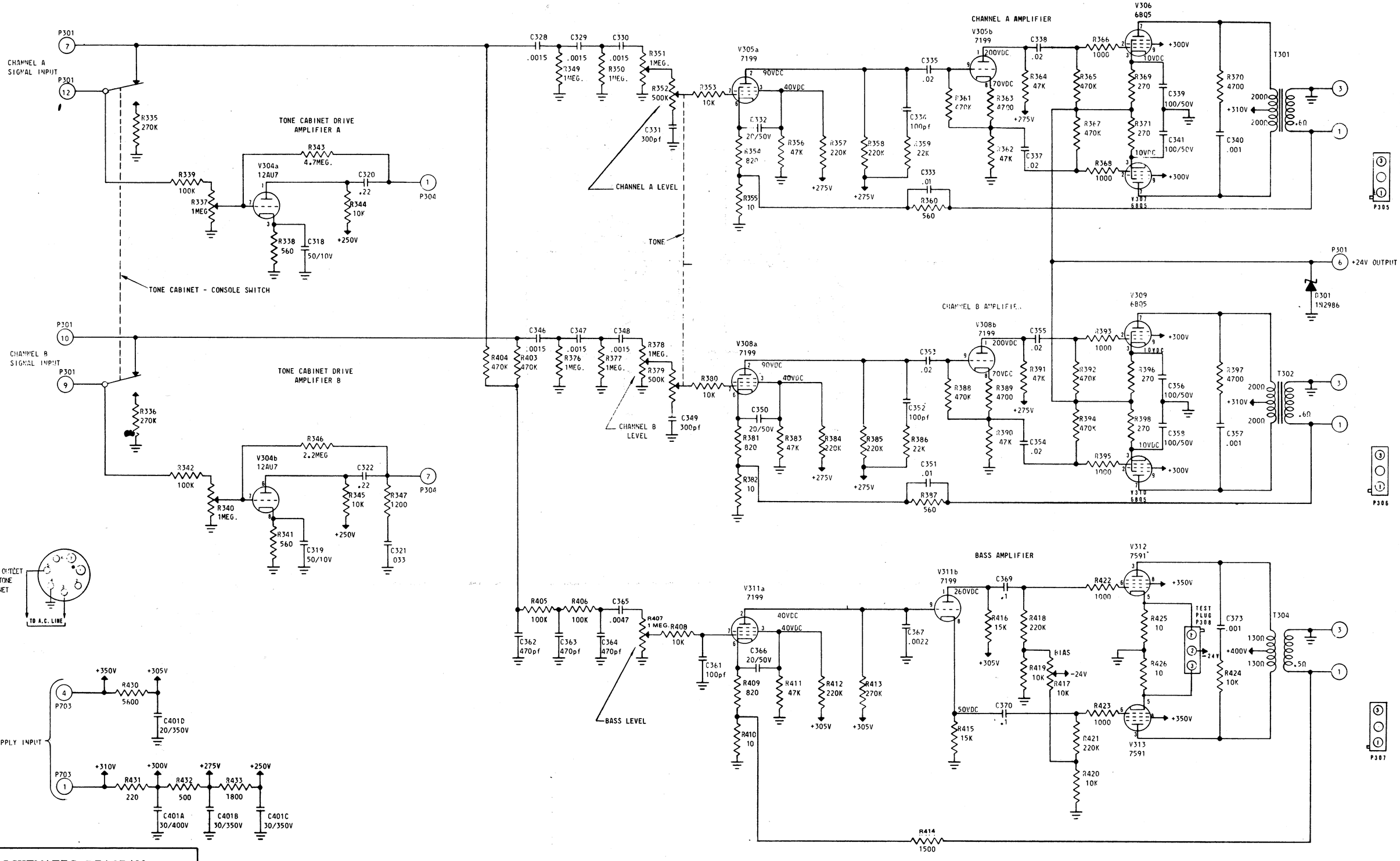
SCHEMATIC DIAGRAM
PERCUSSION AND REITERATION DRIVE
SERIAL NO. 15000 AND UP
128-000001
FIGURE 48



NOTES:

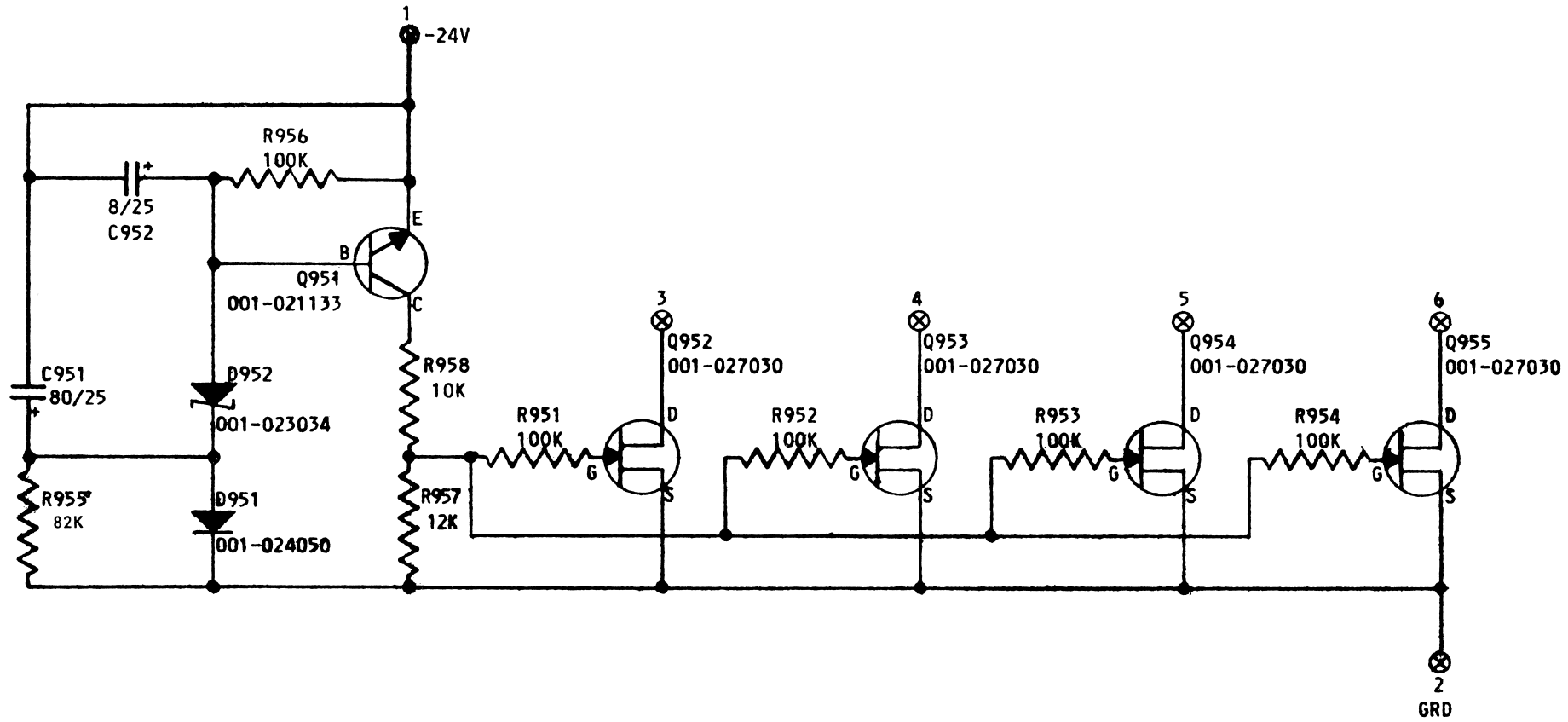
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ±10%, 1/2W.,
   ALL CAPACITORS ARE IN MICROFARADS.

SCHEMATIC DIAGRAM
REVERBERATION SYSTEM
SERIAL NO. 15000 AND UP
PART OF 126-000050
FIGURE 50

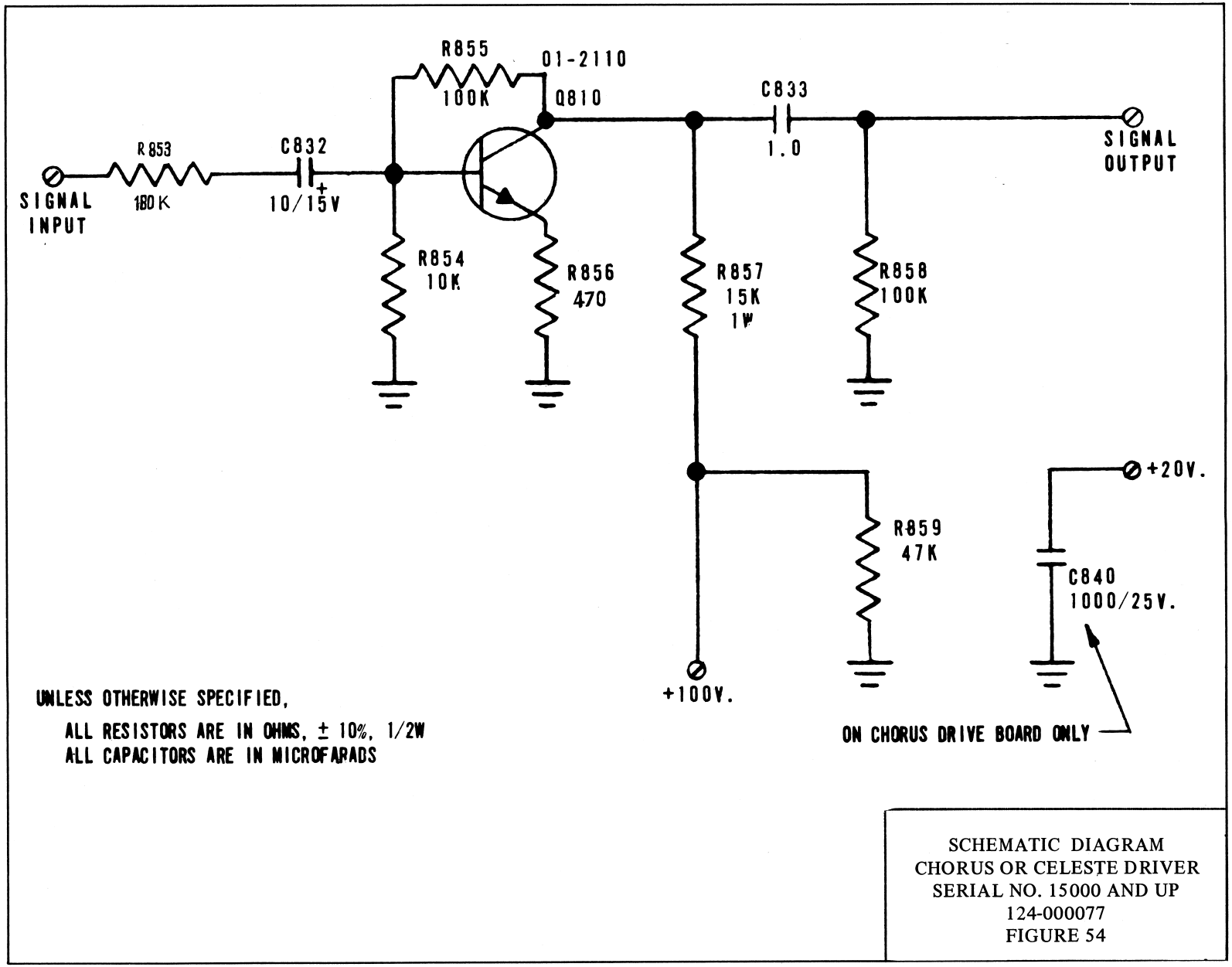


SCHEMATIC DIAGRAM
POWER AMPLIFIER
SERIAL NO. 15000 AND UP
126-000050
FIGURE 51

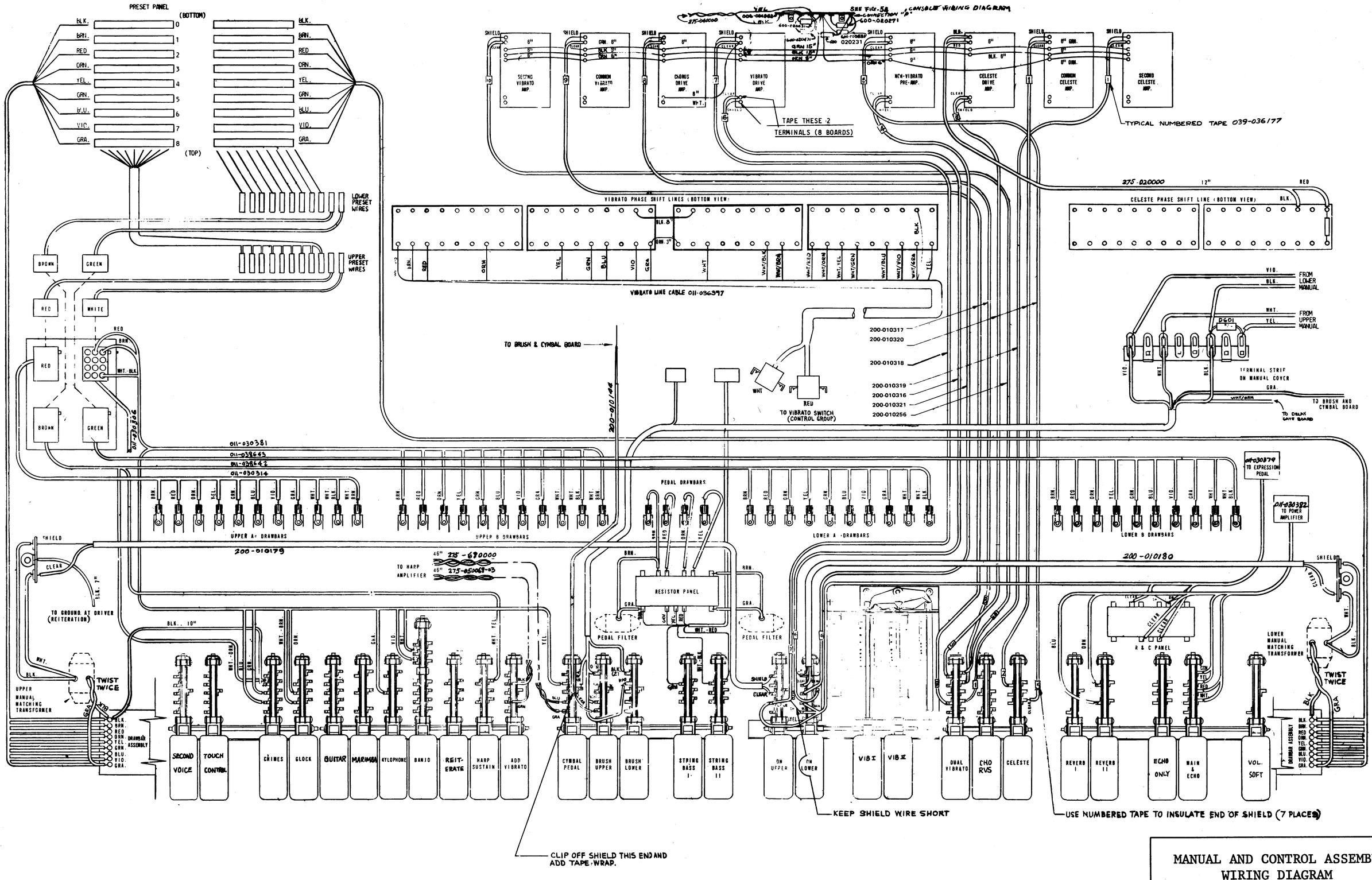
094-040159-O



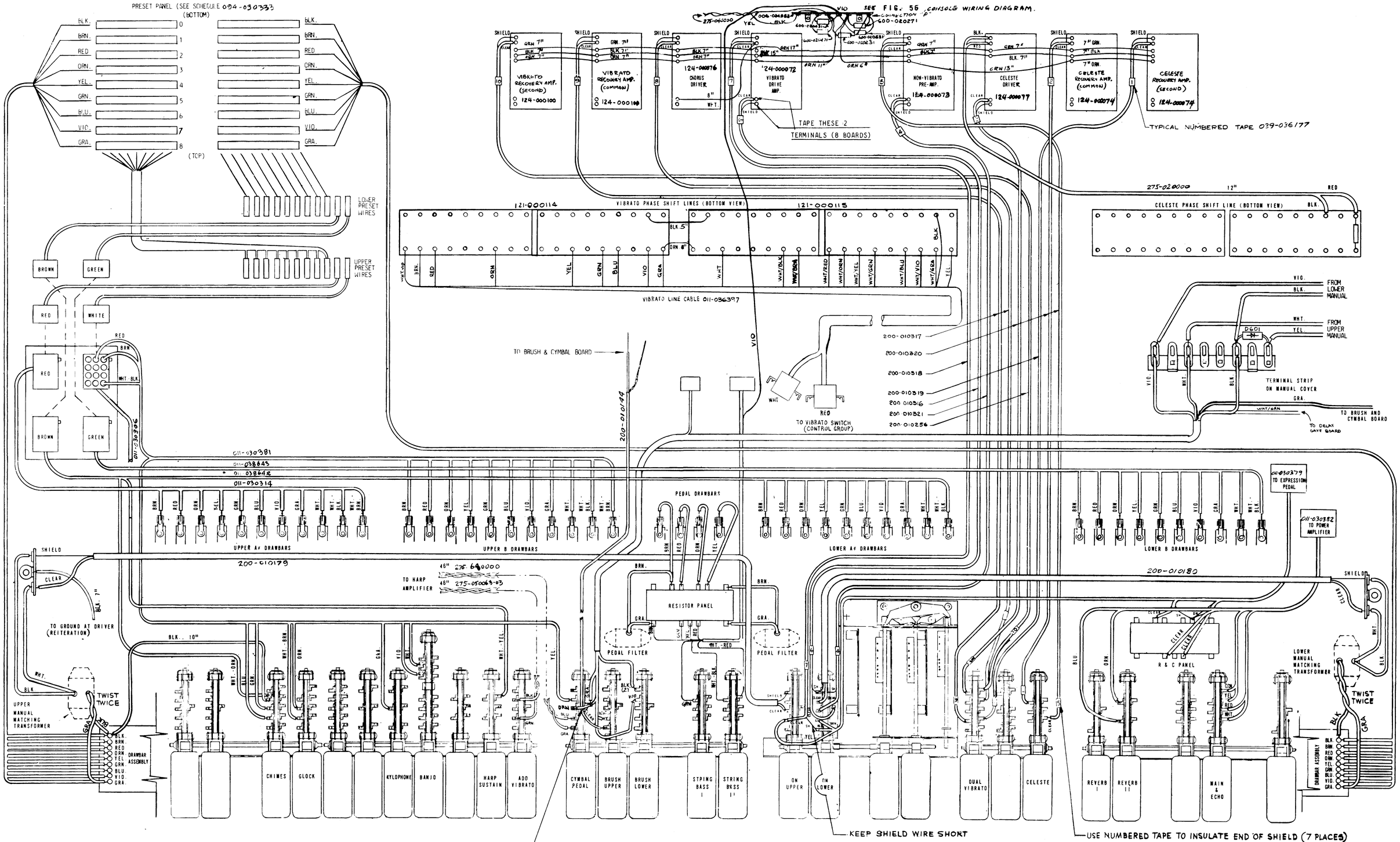
SCHEMATIC DIAGRAM
AUDIO DELAY CIRCUIT
SERIAL NO. 15000 AND UP
124-000019
FIGURE 53



SCHEMATIC DIAGRAM
CHORUS OR CELESTE DRIVER
SERIAL NO. 15000 AND UP
124-000077
FIGURE 54

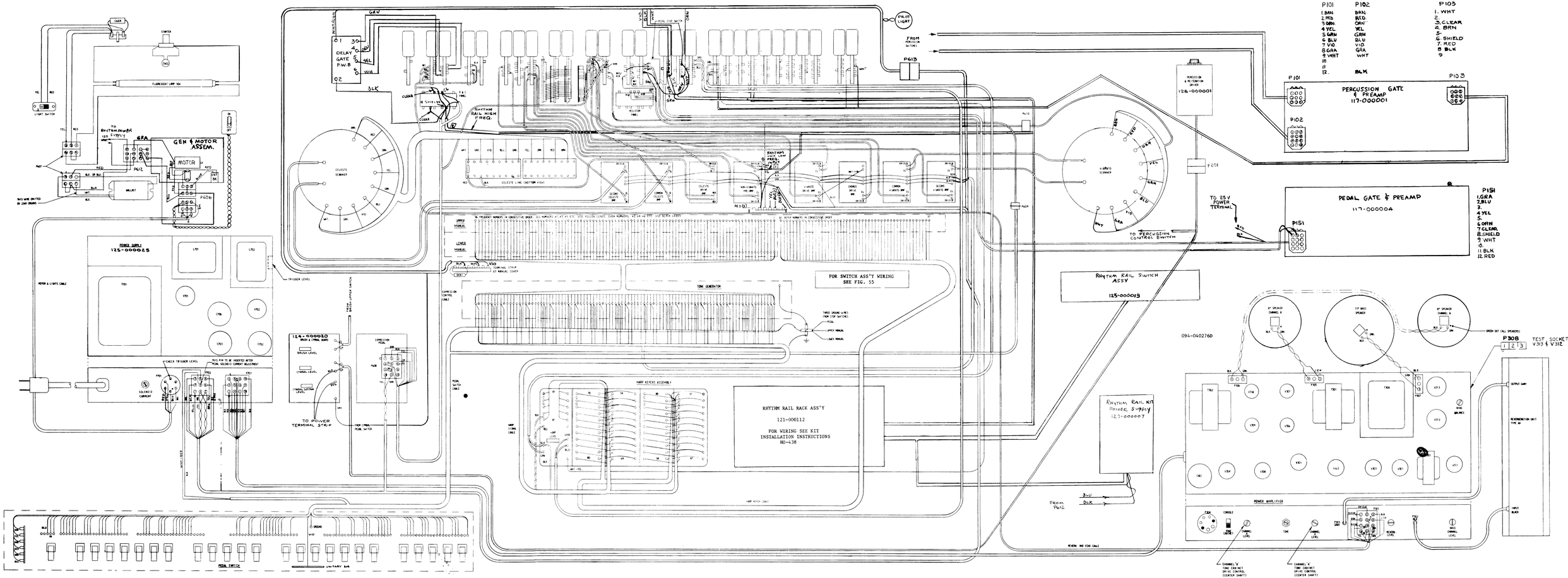


MANUAL AND CONTROL ASSEMBLY
WIRING DIAGRAM
SERIAL NO. 15000 AND UP
FIGURE 55



094-030365R

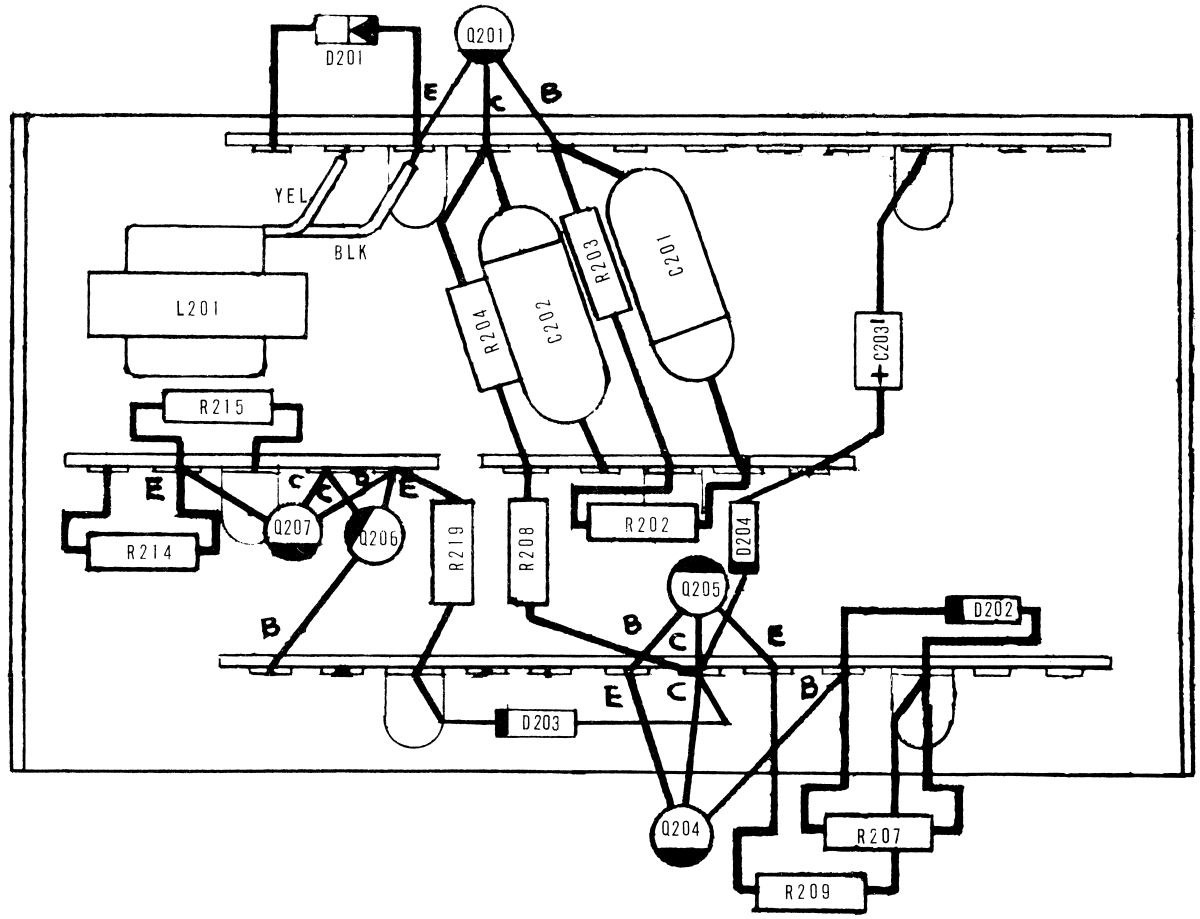
MANUAL AND CONTROL ASSEMBLY
WIRING DIAGRAM
SERIAL NO. 15000 AND UP
REVISED MAY 1969
FIGURE 55A



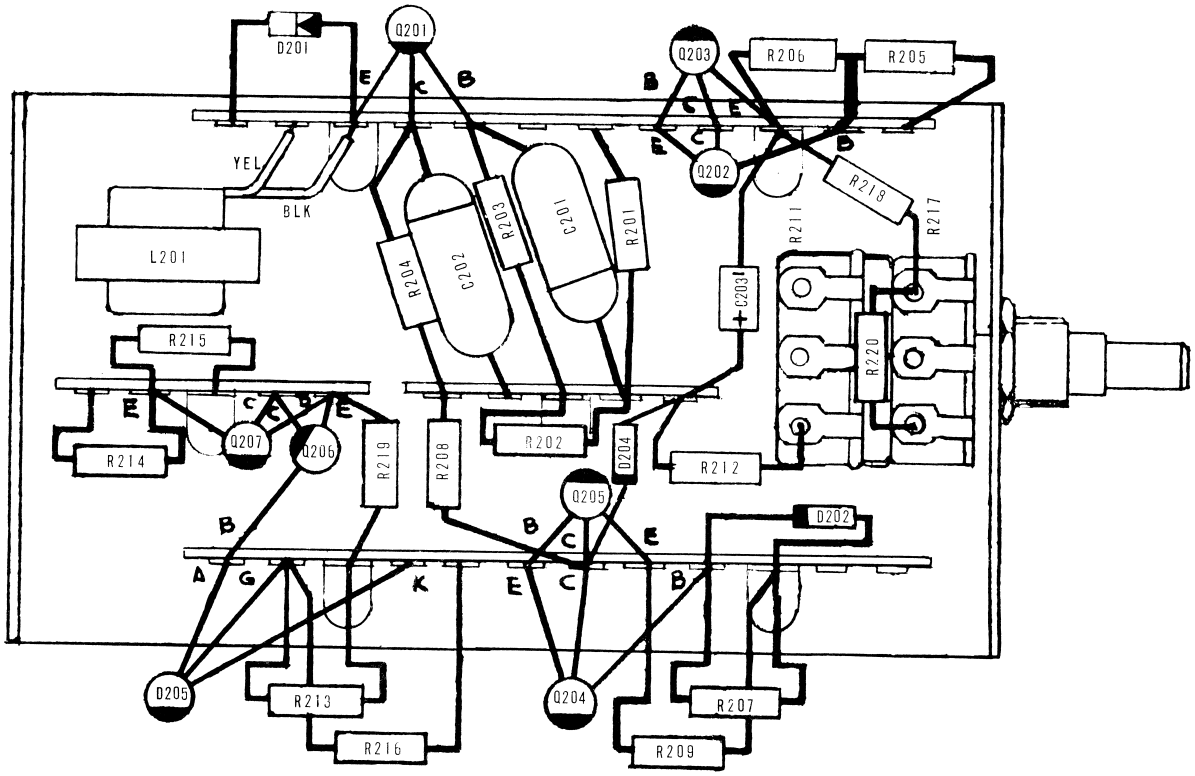
CONSOLE WIRING DIAGRAM
SERIAL NO. 15000 AND UP
FIGURE 56

HARP SUSTAIN & PRE-AMP 124-000076
HARP LEVEL ADJ
HARP SUSTAIN TAB
HARP SIGNAL
HARP KEYING
HARP FREQUENCY
PERCUSSION KEYING SIGNAL
PERCUSSION & REITERATION DRIVER 126-000001
REITERATION & PERCUSSION TABS
PERC RATE CONTROL
PERCUSSION TABS
PERCUSSION GATE 117-000001
PERCUSSION SIGNAL
PERC LEVEL ADJ
PERC GATE ADJ
"B" ADJUST KEY
"A" ADJUST KEY
PRESET KEYS 060-030332
UPPER DRAWBARS 120-000022
RECORDER PANEL 060-030332
MATCHING TRANSFORMER 303-027486
UPPER MANUAL 119-000028
TONE WHEEL GENERATOR 113-000005 & 113-000005
FREQ 1 TO 96
* 112-000044 THRU 112-000047
LOWER MANUAL 119-000027
"B" ADJUST KEY
"A" ADJUST KEY
PRESET KEYS 060-030332
LOWER DRAWBARS 120-000021
RECORDER PANEL 060-030332
MATCHING TRANSFORMER 303-027486
BRUSH & CYMBAL TABS
PEDAL SWITCH 116-000020
PEDAL DRAWBARS 120-000023
PEDAL LEVEL ADJ
PEDAL GATE ADJ
PEDAL GATE & PRE-AMP 117-000004
PEDAL KEYING
SOLENOID CONTROL VOLTAGE
STRING BASS TABS
LATCHING POWER SUPPLY PART OF 127-000025
SOLENOID CURRENT ADJ
PEDAL KEYING SUPPLY
BRUSH & CYMBAL GENERATOR 124-000078
BRUSH LEVEL ADJ
CYMBAL LEVEL ADJ
CYMBAL SUSTAIN ADJ
CUSTOMER BRUSH & CYMBAL LEVEL CONTROL
PERC ADD VIBRATO
NON-VIBRATO
VIBRATO
VIBRATO TABS
NON-VIBRATO PRE-AMP 124-000073
VOLUME SOFT TAB
REVERB DRIVER PART OF 126-000056
REVERB UNIT 121-000093
REVERB RECOVERY PART OF 126-000050
REVERB TABS
ECHO TABS
CHANNEL "A"
CHANNEL "B"
T C DRIVE AMP (PART OF 126-000050)
TONE CABINET OUTLET
"A" LEVEL ADJ
CHANNEL "A" AMP. (PART OF 126-000050)
* 126-000068
TONE CONTROL
CHANNEL "B" AMP (PART OF 126-000050)
* 126-000069
"B" LEVEL ADJ
ISOLATION & MIXING NETWORK (PART OF 126-000050)
* 126-000089
BASS LEVEL ADJ
BASS AMP (PART OF 126-000050)
* 126-000069
8" SPEAKER
8" SPEAKER
15" SPEAKER
VIBRATO LEVEL ADJ
VIBRATO DRIVER 124-000072
CHORUS DRIVER 124-000076
VIBRATO LINE
VIBRATO SCANNER
VIBRATO SLOW-FAST CONTROL
2ND VIBRATO AMP. 124-000075
COMMON VIBRATO AMP 124-000075
VIBRATO TABS
CELESTE DRIVER 124-000077
CELESTE CINE 121-000098
CELESTE SCANNER 121-000094
2ND CELESTE AMP. 124-000074
COMMON CELESTE AMP. 124-000074
SWELL PEDAL 121-000095
* 123-000052
* 123-000050

SYSTEM BLOCK DIAGRAM
SERIAL NO. 15000 AND UP
FIGURE 57

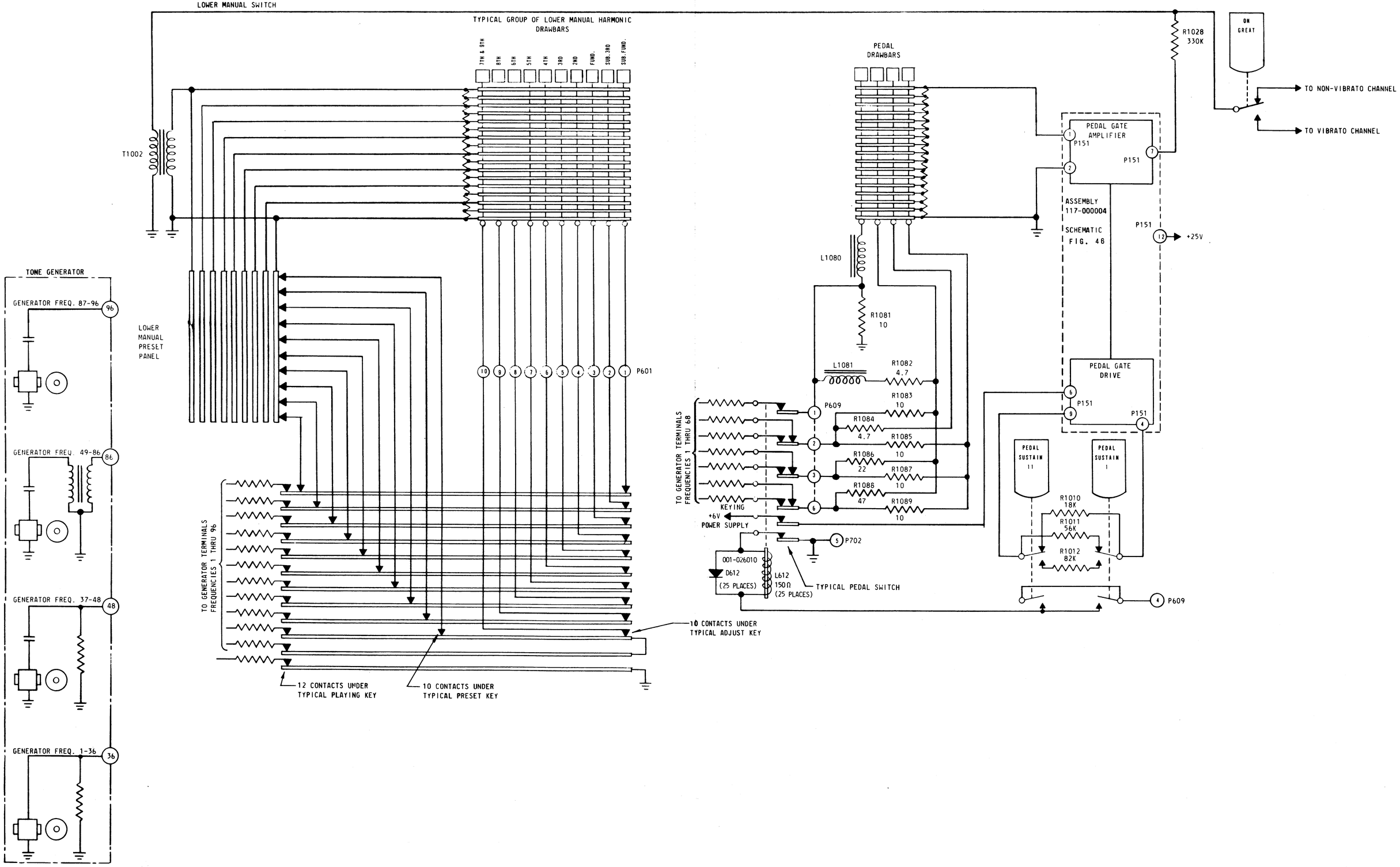


128-000002



128-000001

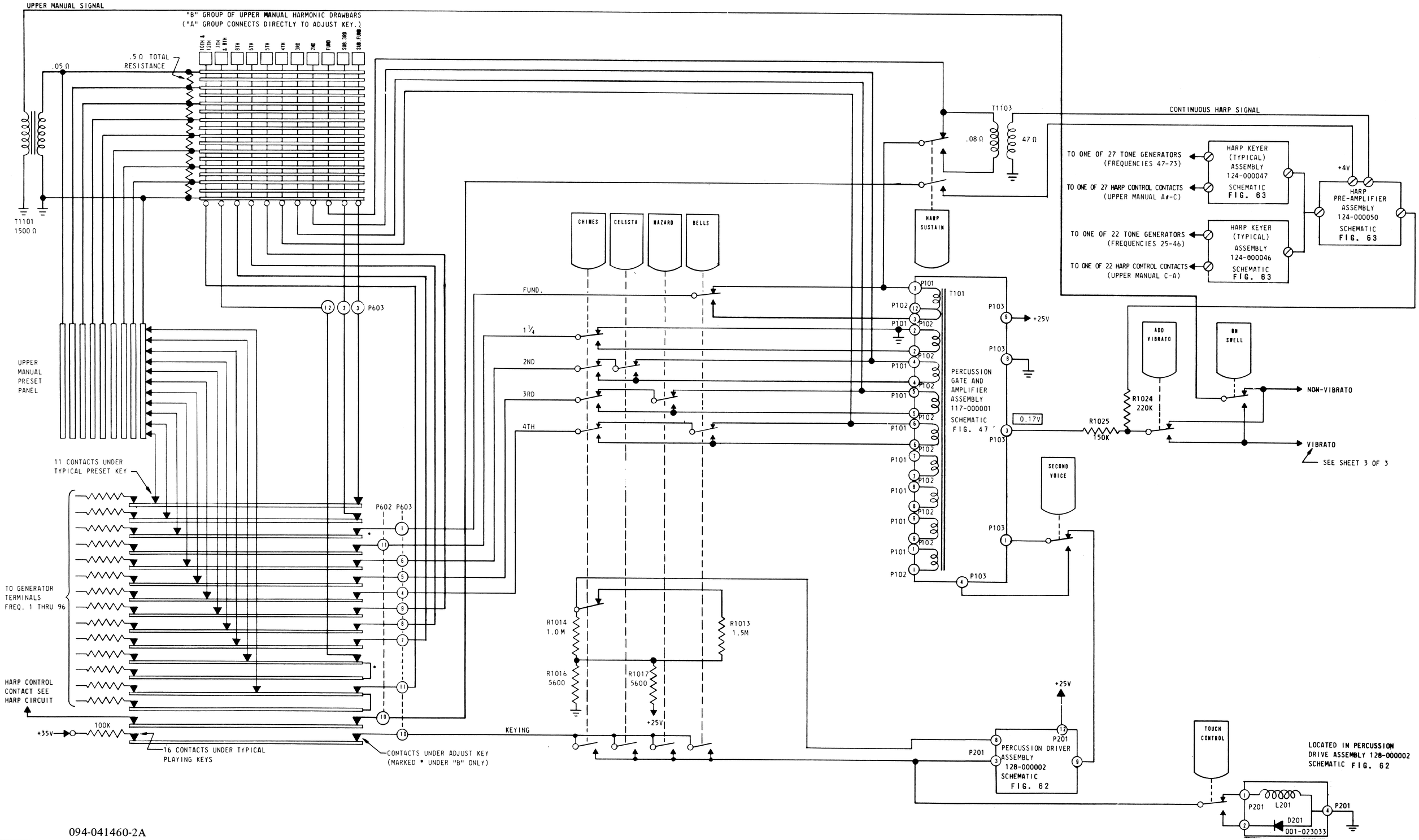
PERCUSSION AND REITERATION
DRIVER ASSEMBLY
H-100 AND H-262
FIGURE 58



094-041460-1

MODEL H-262

FIGURE 59 (SHEET 1 of 3)
SCHEMATIC DIAGRAM
(LOWER MANUAL AND PEDAL)



094-041460-2A

FIGURE 59 (SHEET 2 of 3)
SCHEMATIC DIAGRAM
(UPPER MANUAL AND PERCUSSION)

MODEL H-262

NON-VIBRATO SIGNALS

NON-VIBRATO PREAMPLIFIER 124-000073 SEE SCHEMATIC FIG. 40

.4MV

C601 .015 R603 33K R601 22K R602 39K C600 .001

R1032 270K R1031 270K C1031 300PF

C1029 .0022 R1035 180K C1030 .001 R1036 33K C1032 .02

C1033 .0022 R1037 180K C1034 .001 R1038 22K C1035 .02

MOVABLE SHUTTER LAMP 1866 6.3 VAC R652 2.2Ω PHOTO CELL C651 .082 C650 .082 (P608)

VOLUME SOFT

CHANNEL "A"

CHANNEL "B" SIGNAL

P302 P303 75MV 8MV REVERB. UNIT

REVERBERATION DRIVER AND PREAMPLIFIER (PART OF 126-000050) SEE SCHEMATIC FIG. 50

CHANNEL "A" CATHODE FOLLOWER (PART OF 126-000050) SEE SCHEMATIC FIG. 50

REVERB I | REVERB II | MAIN & ECHO | ECHO ONLY

R1056 10K R1057 100K R1058 470K R1059 10K R1060 33K R1061 47K R1063 2.2M R1064 2.2M

7(P301) CHANNEL "A" AMPLIFIER (P305)

12 (P301) TONE CABINET PRE-AMPLIFIER TONE CABINET OUTLET

9 (P301)

10 (P301) CHANNEL "B" AMPLIFIER (P306)

POWER AMPLIFIER ASSEMBLY 126-000050 SEE SCHEMATIC FIG. 51

BASS CHANNEL (P307)

10 9 12 7 DELAY GATE ASSEMBLY -24V SEE SCHEMATIC FIG. 53

VIBRATO I | VIBRATO II | VIBRATO III

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

31 CAPACITORS .0022

VIBRATO SCANNER

COMMON VIBRATO AMPLIFIER 124-000100 SEE SCHEMATIC FIG. 49

2ND VIBRATO AMPLIFIER 124-000100 SEE SCHEMATIC FIG. 49

DUAL VIBRATO | CHORUS | CELESTE

R1046 270K R1045 270K R1047 470K R1044 220K R1050 47K R1048 220K R1049 220K

CHANNEL "B" | CHANNEL "A"

C602 .01 STARTER FLUORESCENT TUBE

CIRCUIT BREAKER

C604 .22

M GEN. MOTOR

BALLAST

ON-OFF SWITCH

6.3V AC PILOT LAMP

ONE SIDE OF POWER TRANSFORMER

POWER SUPPLY 125-000025 THRU 27 SEE SCHEMATIC FIG. 52

OTHER SIDE OF POWER TRANSFORMER

INPUT AC

WIRING NOTE 1

120V 50/60 HZ ONLY

240V 50/60 HZ ONLY

COMMON CELESTE AMPLIFIER 124-000074 SEE SCHEMATIC FIG. 41

2ND CELESTE AMPLIFIER 124-000074 SEE SCHEMATIC FIG. 41

CELESTE SCANNER

CELESTE DRIVE AMPLIFIER 124-000077 SEE SCHEMATIC FIG. 54

TO P.W.B. PREAMPS

R2000 120Ω +24V R2001 1500Ω +6V R2002 560Ω

POWER DISTRIBUTION

.0056 .0056 .0056 .0056 .0056 .0056 .0056 .0056

R604 1800Ω

.022 .022 .022 .022 .022 .022 .022 .022 R605 5600Ω

VIBRATO SIGNALS

VIBRATO DRIVE AMPLIFIER 124-000072 SEE SCHEMATIC FIG. 41

180V DC

BIAS

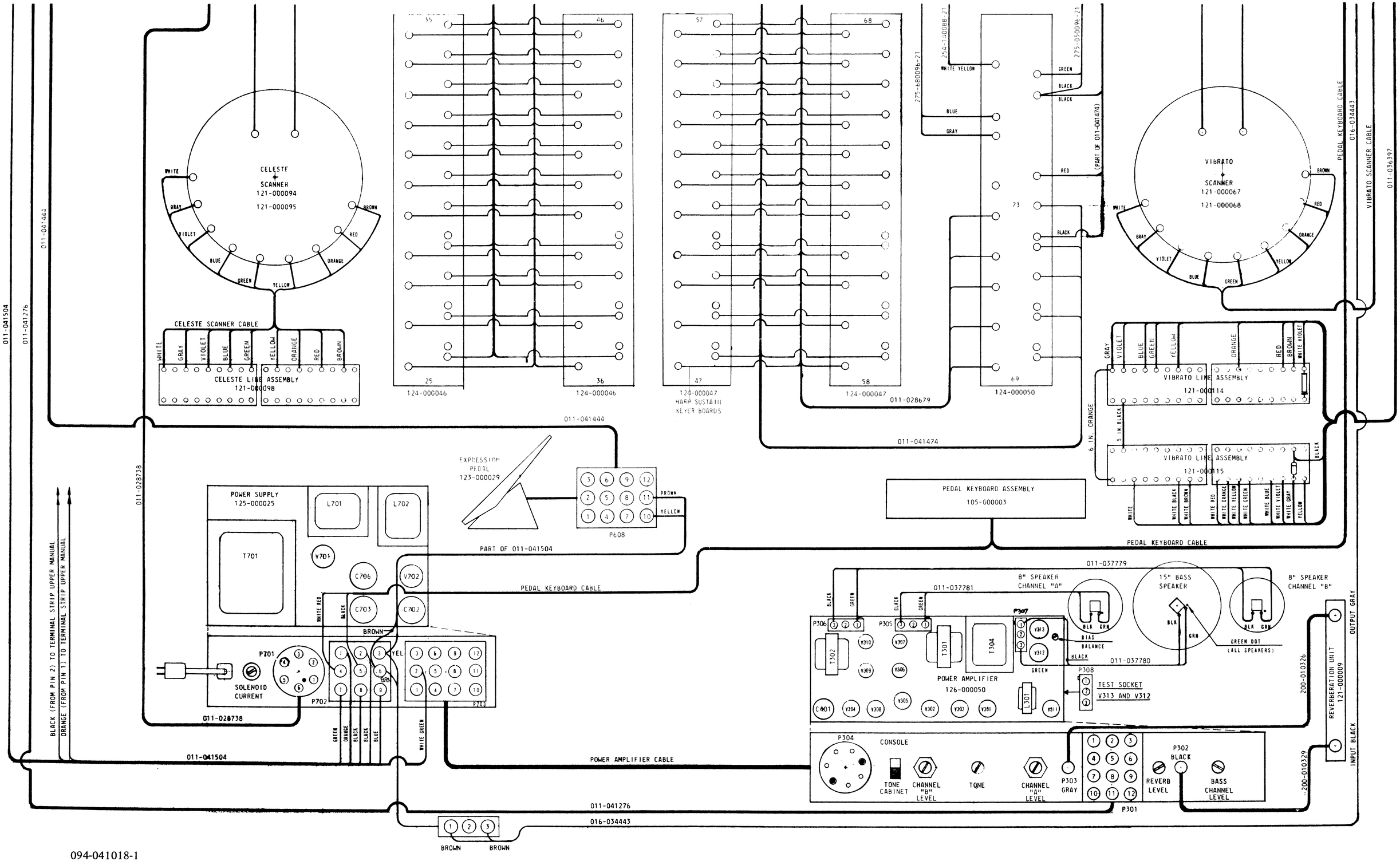
VIBRATO LEVEL ADJUST

CHORUS DRIVE AMPLIFIER 124-000076 SEE SCHEMATIC FIG. 41

094-041460-3

FIGURE 59 (SHEET 3 of 3) SCHEMATIC DIAGRAM (VIBRATO AND AMPLIFICATION)

MODEL H-262

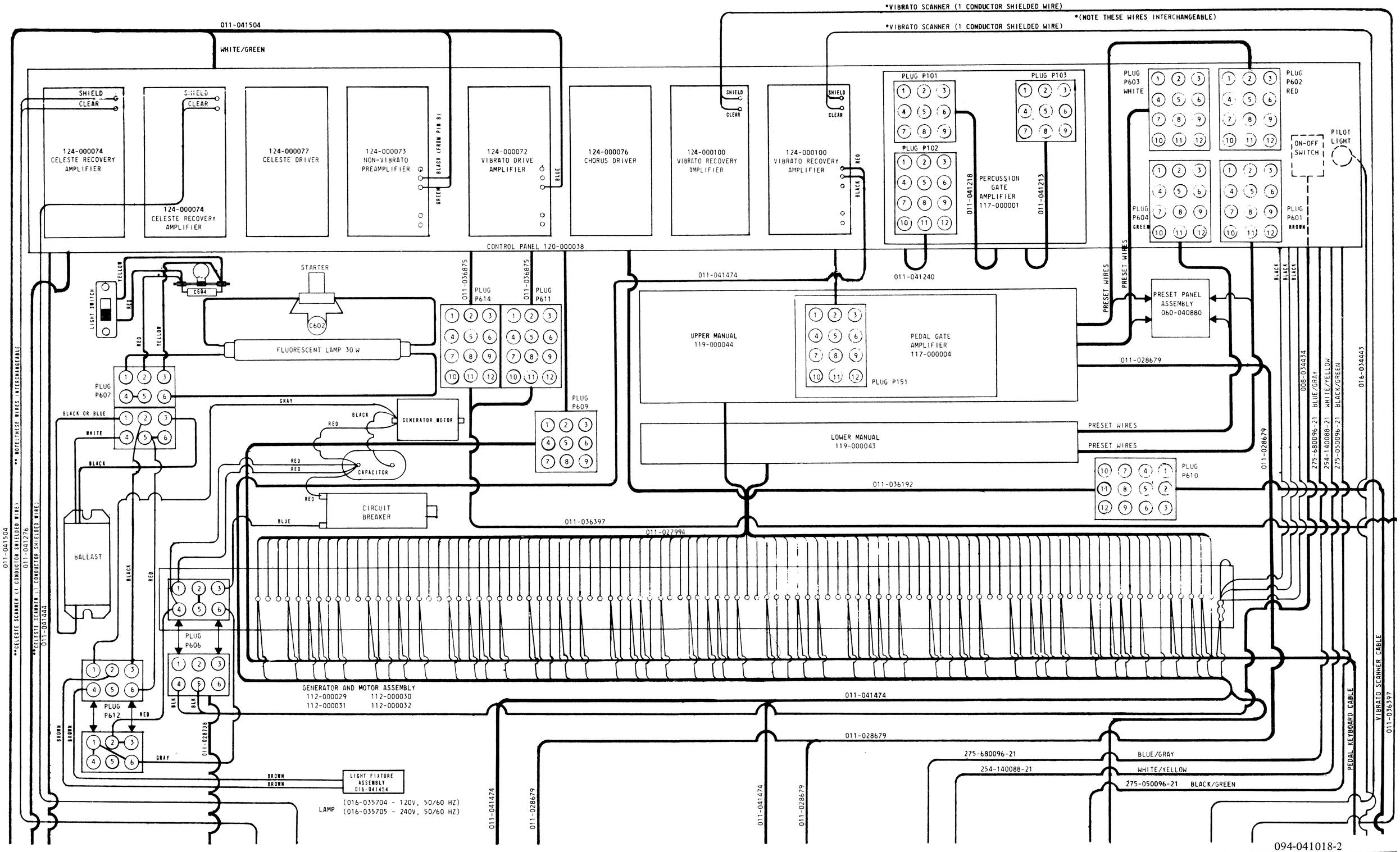


094-041018-1

FIGURE 60 (SHEET 1 of 2)
WIRING DIAGRAM
(CONSOLE)

MODEL H-262

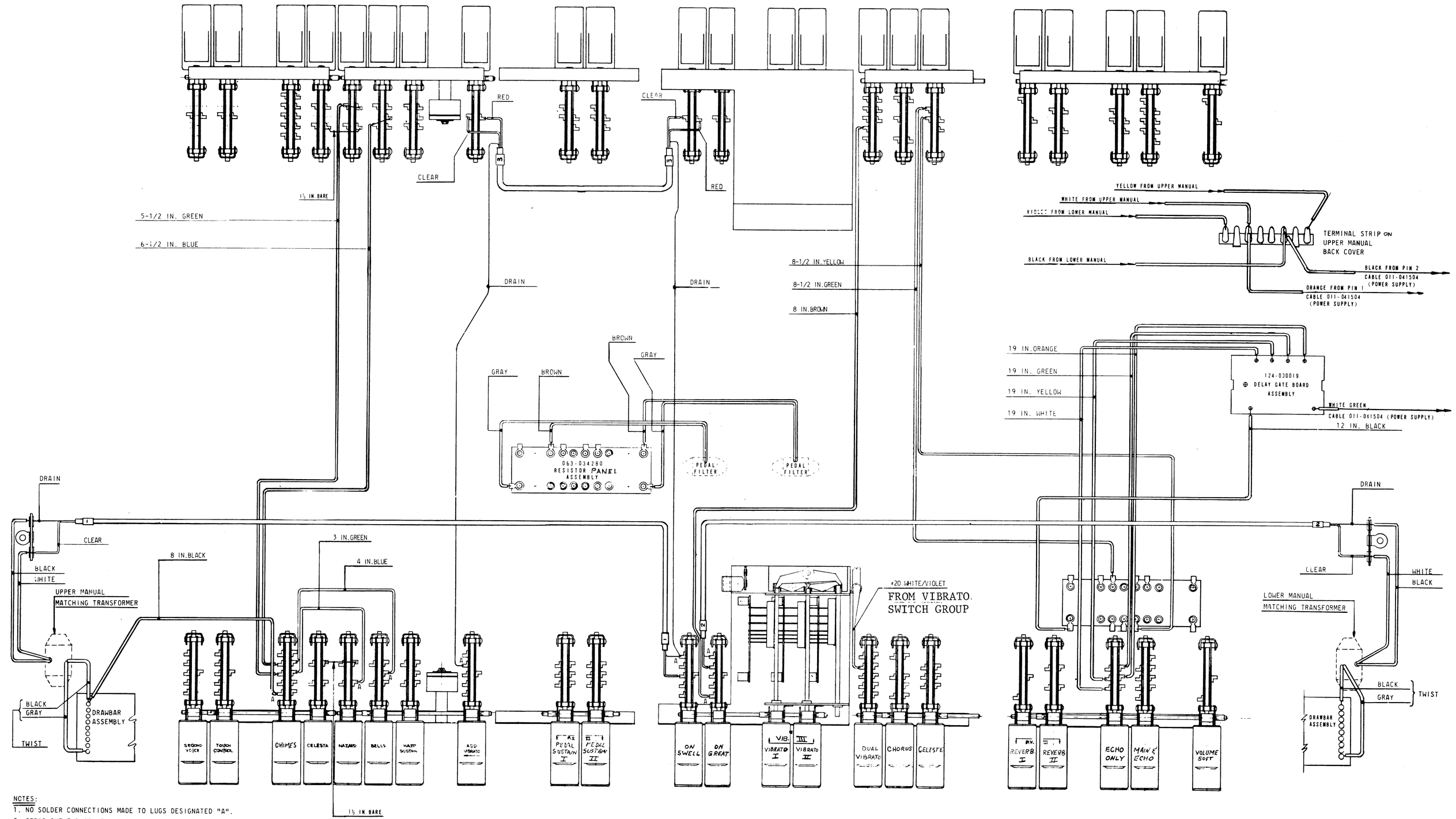
NOTES:
For Wiring Diagram of Control Panel See Fig. 61, Sheets 1 thru 4.



094-041018-2

FIGURE 60 (SHEET 2 of 2)
WIRING DIAGRAM
(CONSOLE)

MODEL H-262



NOTES:
1. NO SOLDER CONNECTIONS MADE TO LUGS DESIGNATED "A".
2. STRIP ONE END OF LEAD DESIGNATED "X" 7/8 INCH, STRIP OTHER END 3/8 INCH.
3. ROUTE OF WIRES AND COMPONENTS SHOWN FOR CLARITY ONLY.
4. STRIP ALL LEADS 3/8 INCH BOTH ENDS, UNLESS OTHERWISE SPECIFIED.

120-000039-1B

FIGURE 61 (SHEET 1 of 4)
CONTROL PANEL WIRING
ASSEMBLY

MODEL H-262

WHITE/ORANGE

WHITE/YELLOW

YELLOW
GREEN
BLUE

WHITE/RED

ORANGE

3	RED 2	BROWN 1
6	5	4
WHITE 9	GRAY 8	VIOLET 7
12	WHT BRN 11	WHT BLK 10

P603
SHOWING ITEM 91 INSERTIONS

RED P602

WHITE P603

BROWN P601

GREEN P604

SWELL DRAWBARS A

SWELL DRAWBARS B

PEDAL DRAWBARS

R2002

R2001

R2000

GREAT DRAWBARS A

GREAT DRAWBARS B

BROWN
RED
ORANGE
YELLOW

063-034280
RESISTOR PANEL
ASSEMBLY

TERMINAL STRIP, CONTROL PANEL BACK COVER

60 6 IN. ORANGE FROM SHT. 3 OF 4

61 8 IN. ORANGE FROM SHT. 3 OF 4

VIOLET

BLACK
BROWN
YELLOW
GRAY
ORANGE

TO PEDAL SWITCH

GREEN
YELLOW
BLUE
ORANGE
FROM SWELL DRAWBARS B

GREEN
WHITE/BLACK
WHITE/RED

TO PERCUSSION DRIVE

P201

RED
WHITE

SECOND VOICE
TOUCH CONTROL
CHIMES
CELESTA
NAZARD
BELLS
HARP SUSTAIN
ADD VIBRATO
PEDAL SUSTAIN I
PEDAL SUSTAIN II
ON SWELL
ON GREAT
VIB. I VIBRATO I
VIB. II VIBRATO II
DUAL VIBRATO
CHORUS
CELESTE
REV. I REVERB I
REV. II REVERB II
ECHO ONLY
MAIN & ECHO
VOLUME SOFT

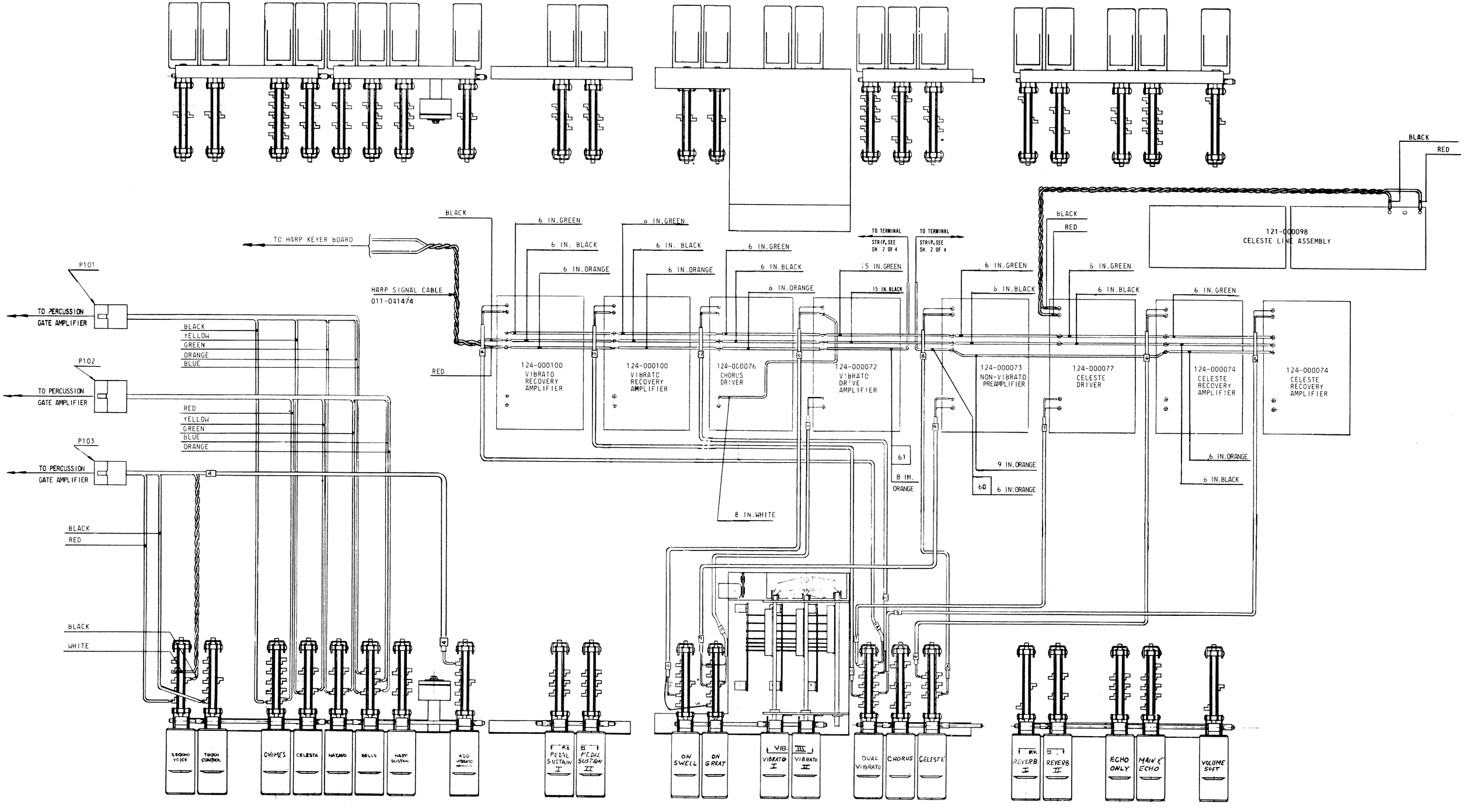
NOTES:

1. NO SOLDER CONNECTIONS MADE TO LUGS DESIGNATED "A".
2. ROUTE OF WIRES AND COMPONENTS SHOWN FOR CLARITY ONLY.

120-000039-2A

FIGURE 61 (SHEET 2 of 4)
CONTROL PANEL WIRING
ASSEMBLY

MODEL H-262



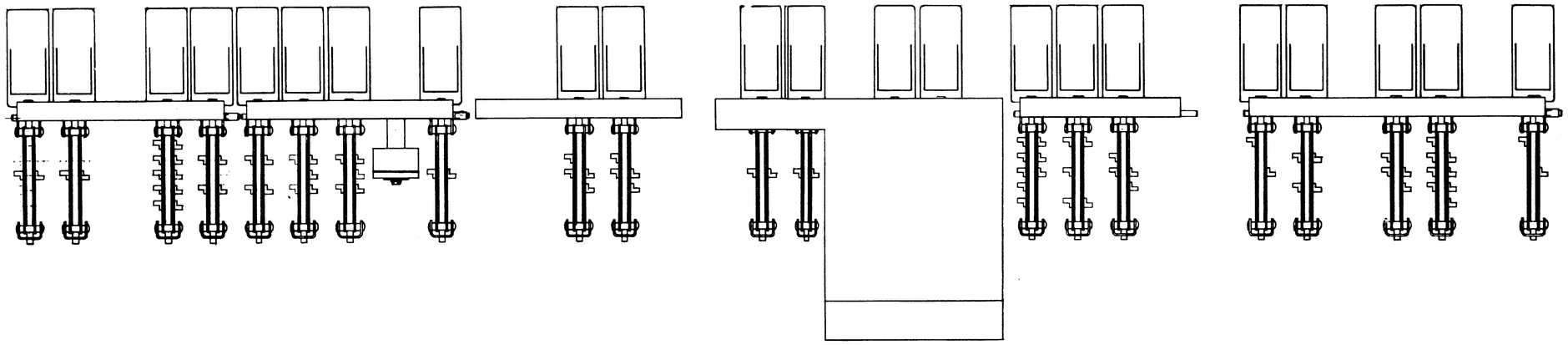
NOTES:

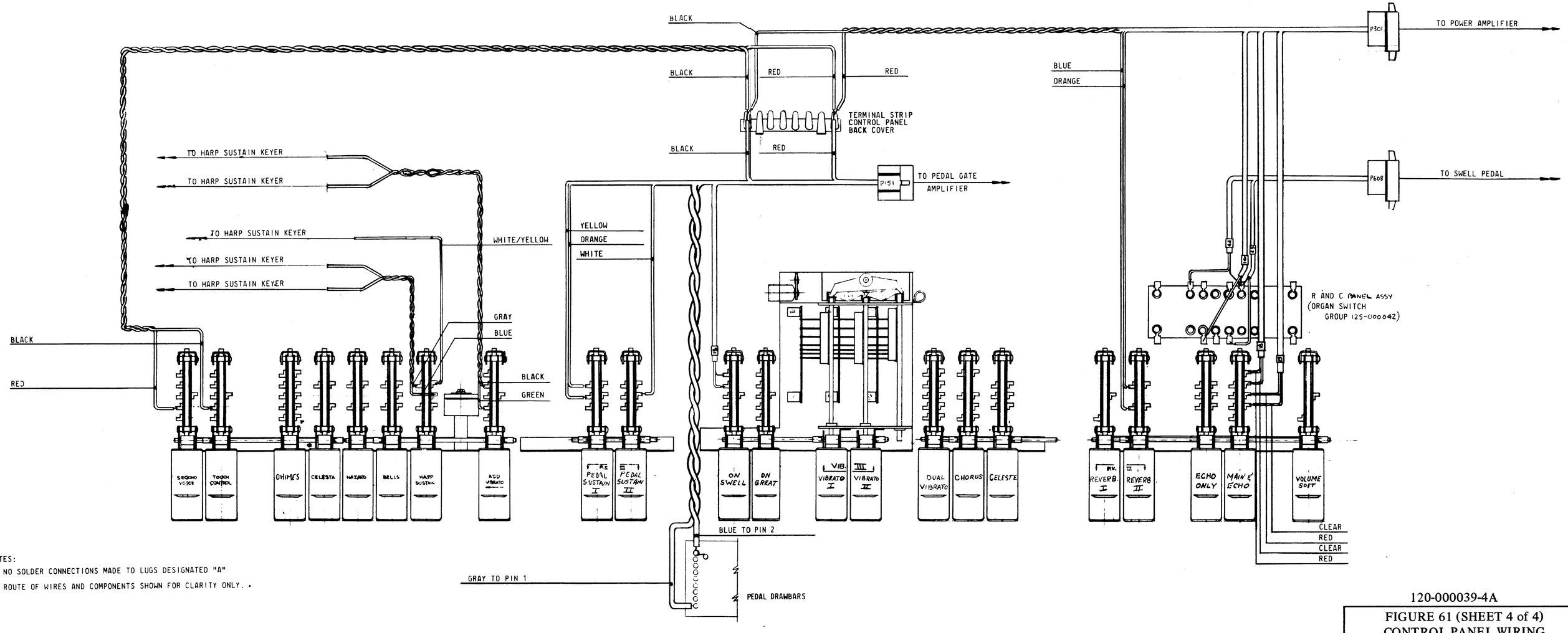
1. NO SOLDER CONNECTIONS MADE TO LUGS DESIGNATED "A".
2. ROUTE OF WIRES AND COMPONENTS SHOWN FOR CLARITY ONLY.

120-000039-3A

FIGURE 61 (SHEET 3 of 4)
CONTROL PANEL WIRING
ASSEMBLY

MODEL H-262

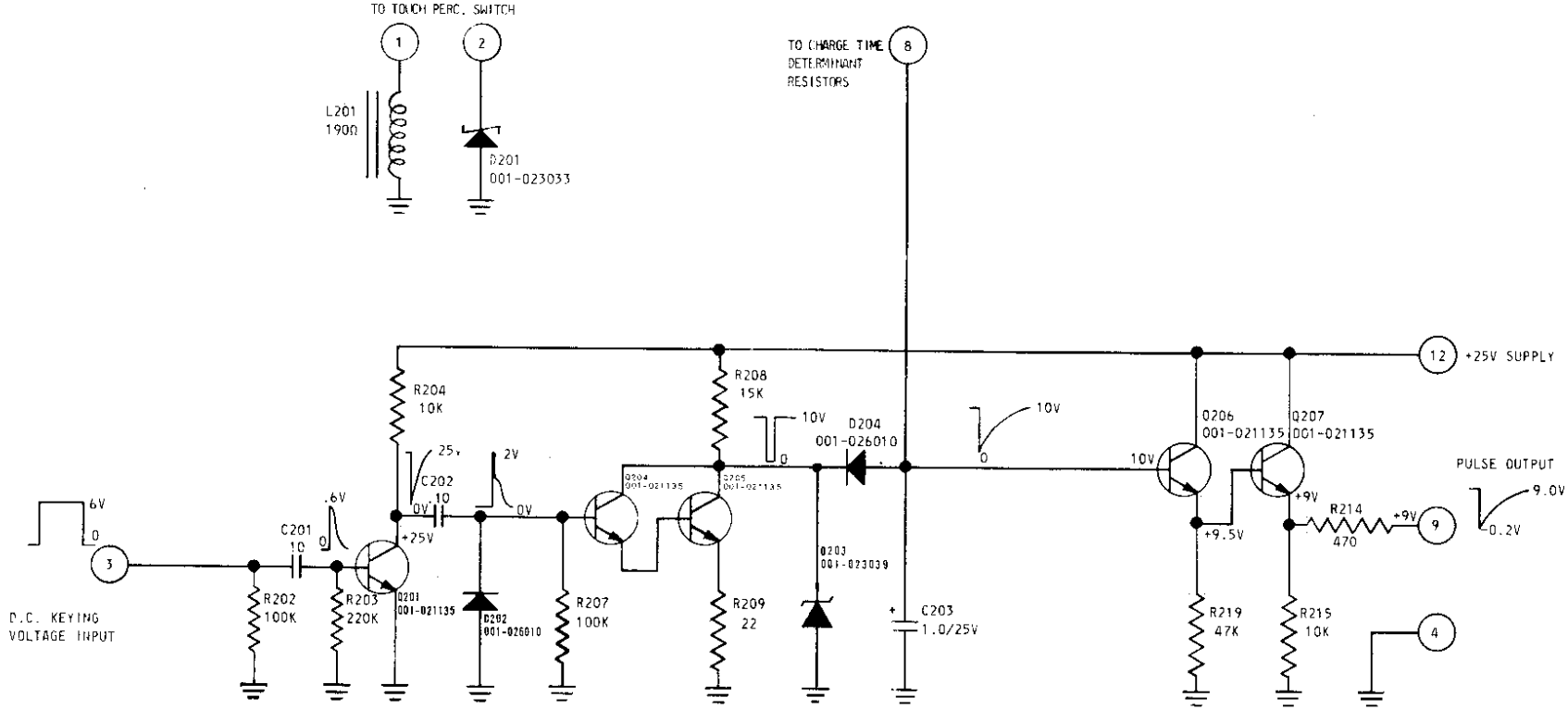




NOTES:
1. NO SOLDER CONNECTIONS MADE TO LUGS DESIGNATED "A"
2. ROUTE OF WIRES AND COMPONENTS SHOWN FOR CLARITY ONLY.

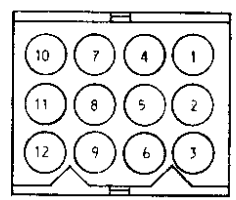
120-000039-4A

FIGURE 61 (SHEET 4 of 4)
CONTROL PANEL WIRING
ASSEMBLY



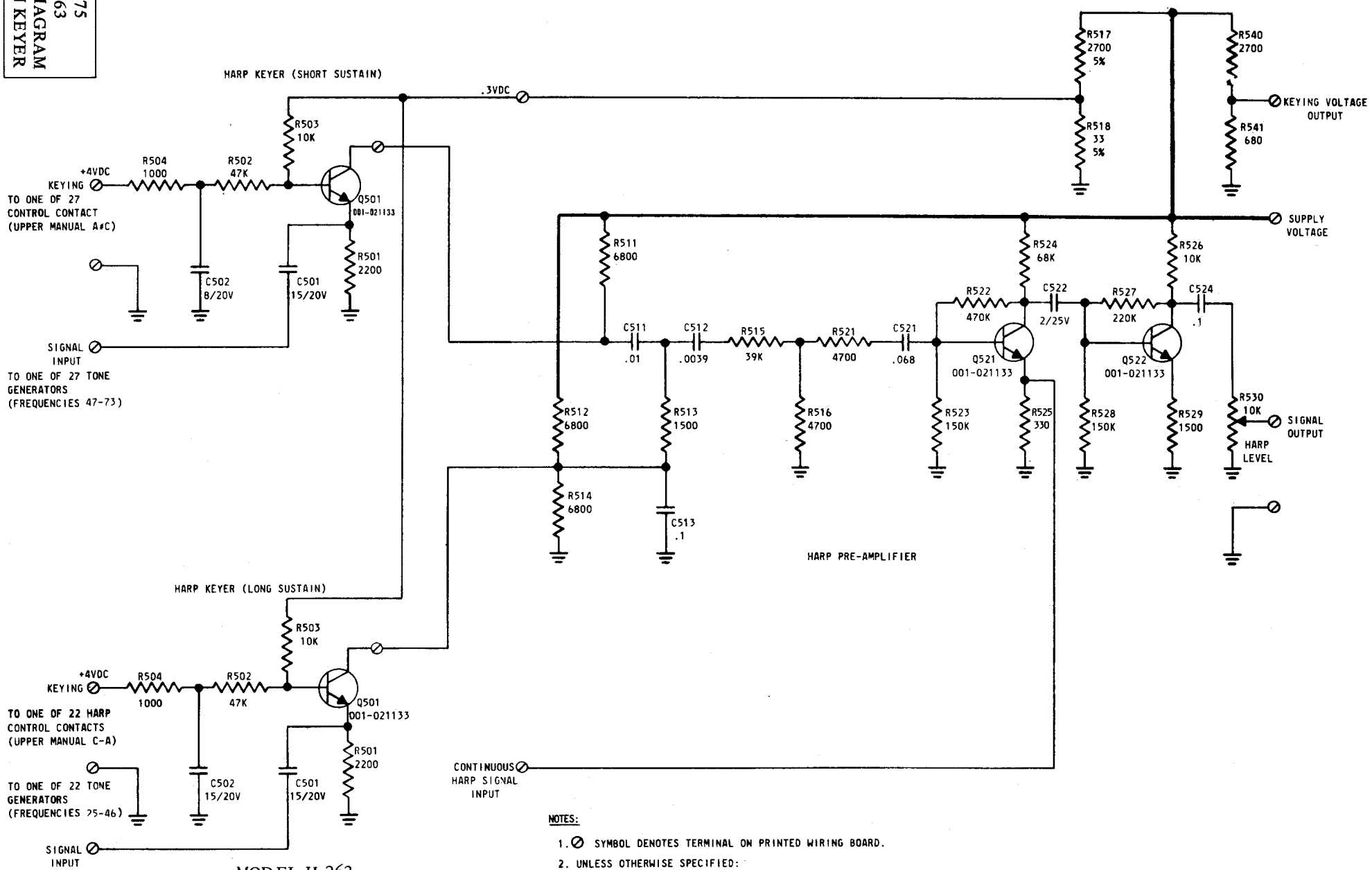
NOTES:

1. ○ SYMBOL DENOTES TERMINAL IN PLUG.
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS.



PLUG 201
(REAR VIEW SHOWN)

094-041475
FIGURE 63
SCHEMATIC DIAGRAM
HARP SUSTAIN KEYER



MODEL H-262

NOTES:

1. ⊘ SYMBOL DENOTES TERMINAL ON PRINTED WIRING BOARD.
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS.

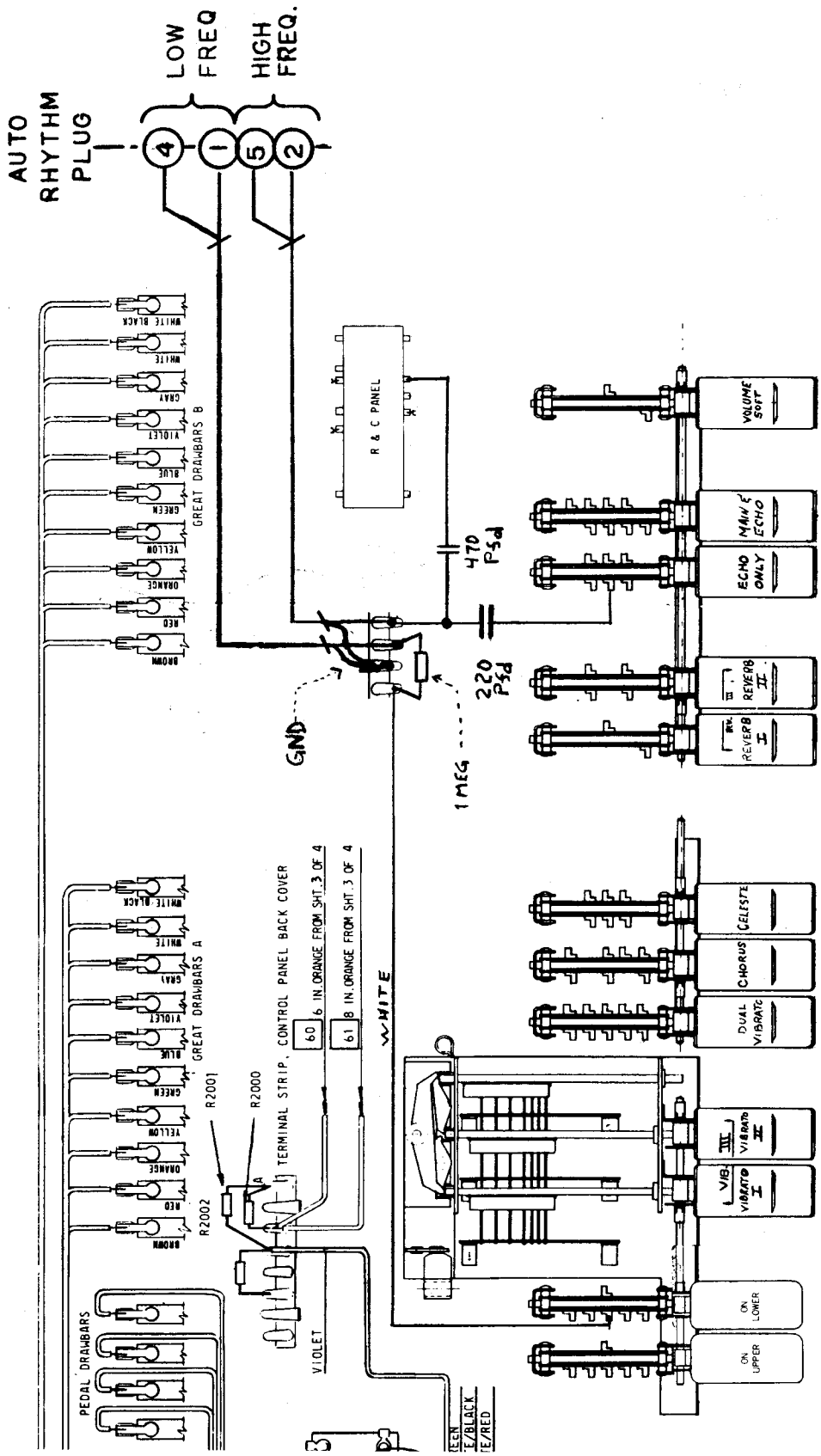
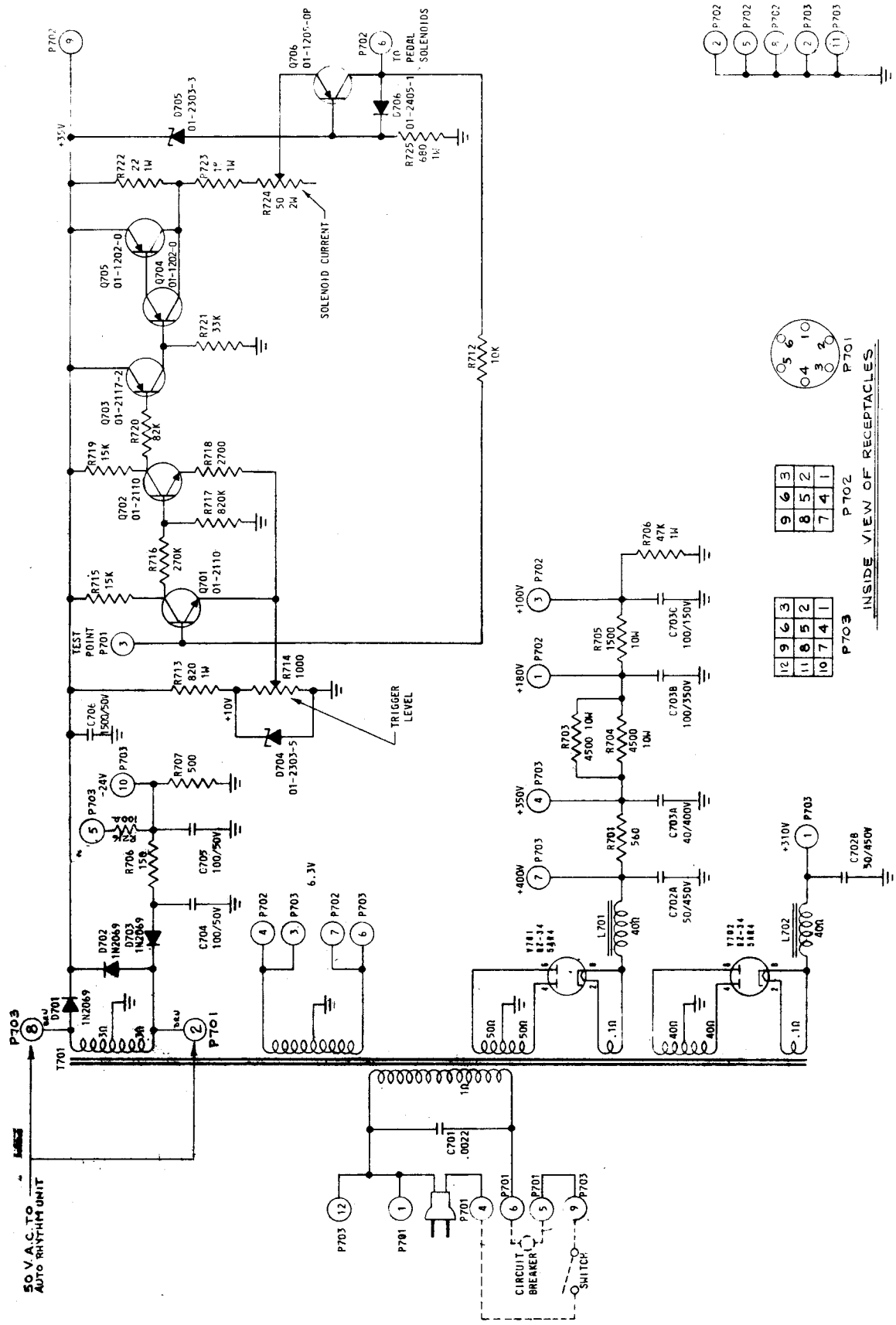


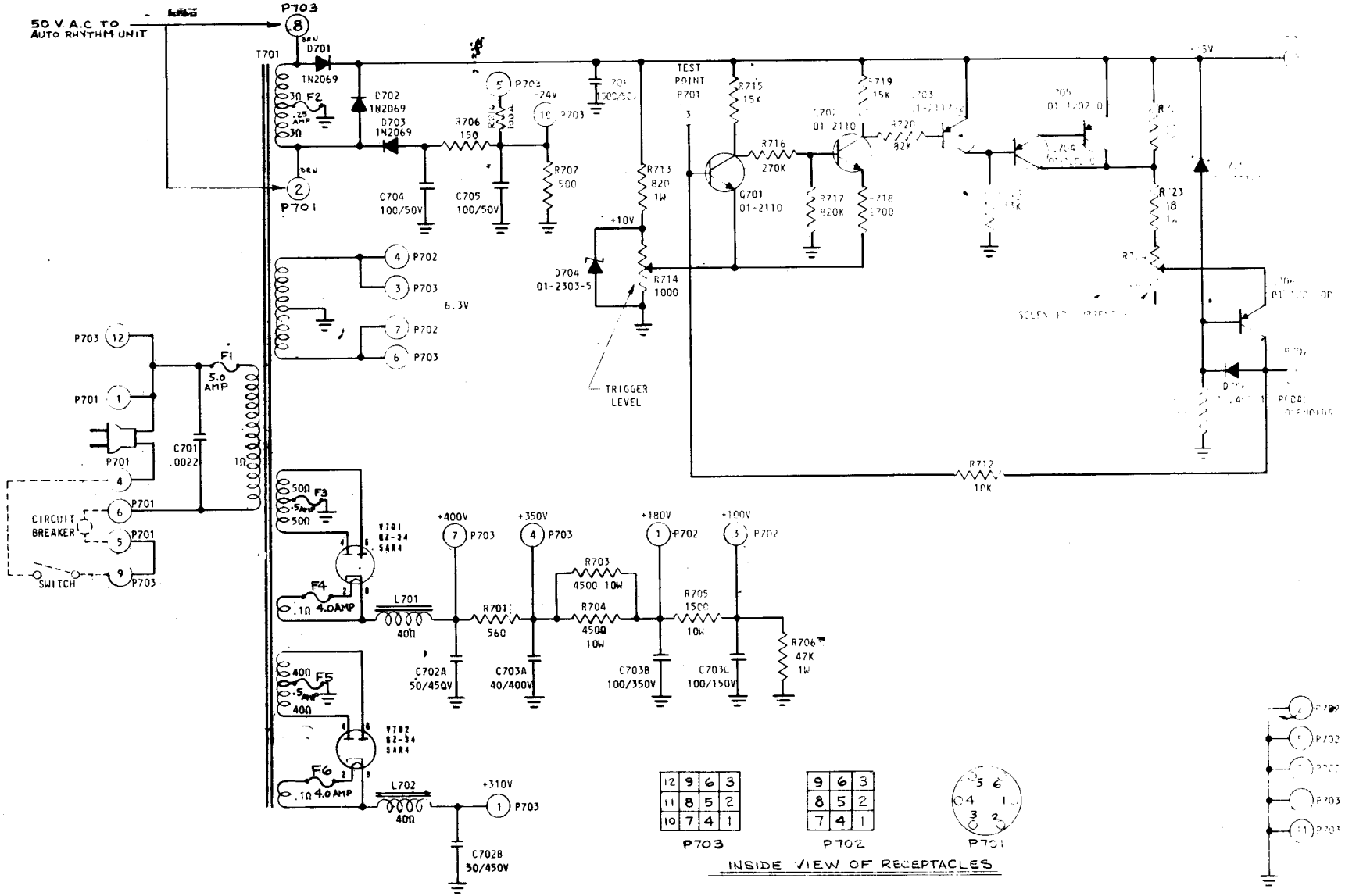
FIGURE 68
CONTROL PANEL
WIRING CHANGES

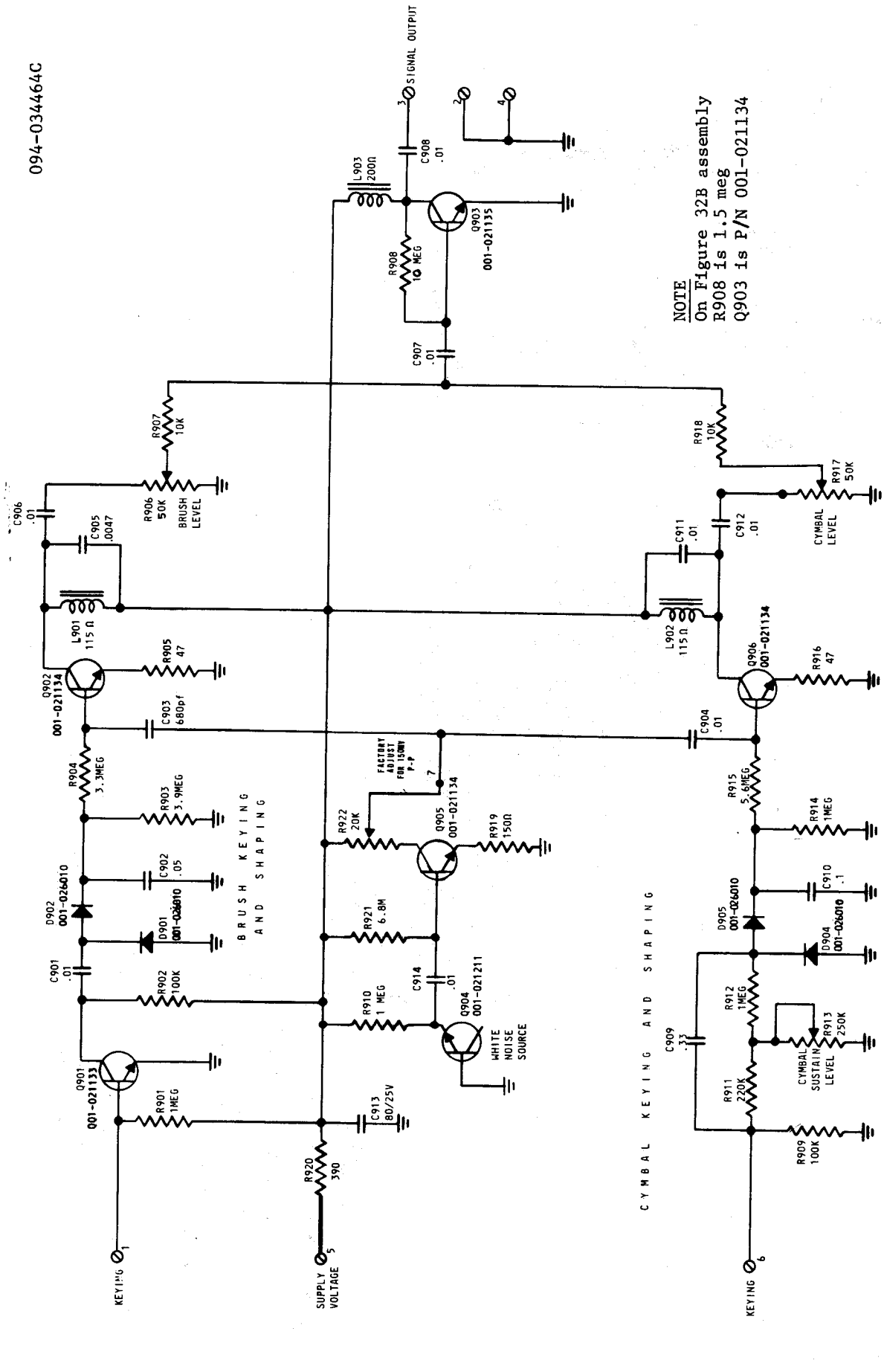


127-000035

FIGURE 69
H-300 POWER SUPPLY
ASSEMBLIES

127-000044
CANADIAN





NOTES:
1. ⊘ SYMBOL DENOTES TERMINAL ON PRINTED WIRING BOARD.
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, ± 10%, 1/2 WATT;
   ALL CAPACITORS ARE IN MICROFARADS

SCHEMATIC DIAGRAM, BRUSH AND CYMBAL BOARD, LATER PRODUCTION
FIGURE 64

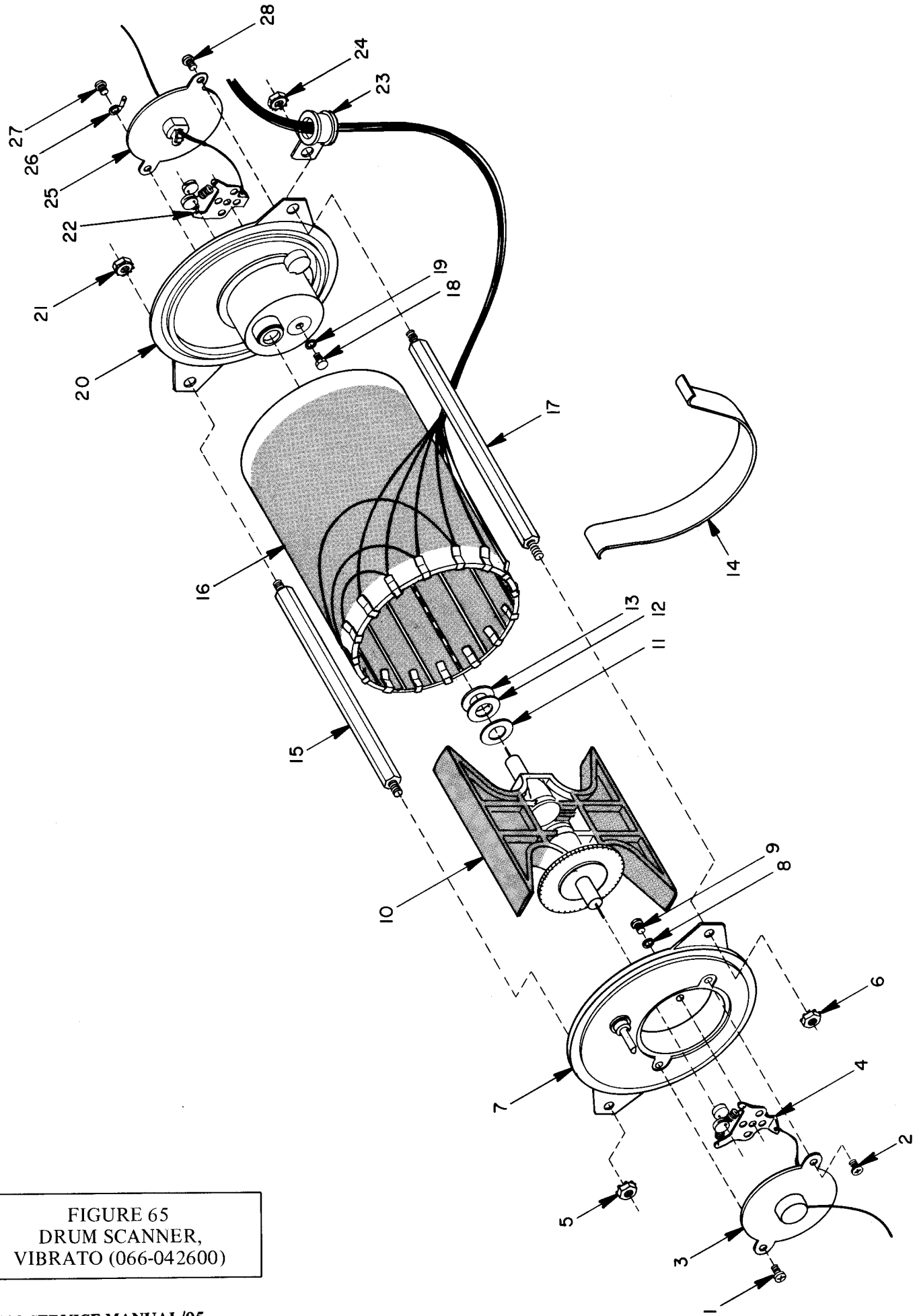


FIGURE 65
DRUM SCANNER,
VIBRATO (066-042600)

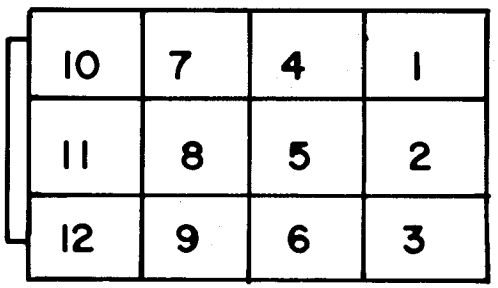
1 BROWN
2 BLACK
3 WHITE
} VIBRATO CANCEL SWITCH

4 YELLOW
5 BLACK
6 GREEN
} PHOTOCELL

7 BLACK GND

8 WHITE/BLACK
9 BLACK
} RHYTHM SWELL CANCEL SWITCH

10 WHITE
11 BROWN
12 BLANK
} 6.3V.A.C.



P608

FRONT VIEW

123-000052

FIGURE 70
SWELL PEDAL ASSEMBLY
(123-000052),
PLUG CONNECTIONS

1 CL
2 SH
3 RED
} PHOTO CELL 1

4 CL
5 SH & BLK
} PHOTO CELL 2

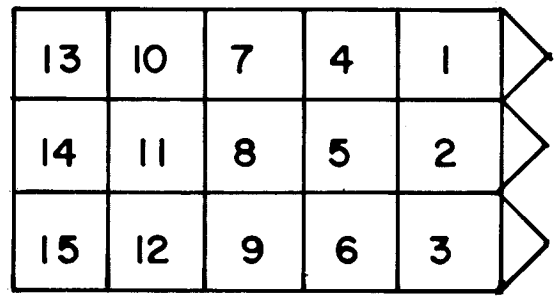
6 BLANK

7 ORANGE
8 YELLOW
9 BROWN
} VIBRATO CANCEL SWITCH

10 GREEN
11 BLUE
} RHYTHM CANCEL SWITCH

12 BLANK
13 BLANK

14 WHITE
15 BLACK
} 6.3V A.C



FRONT VIEW
123-000060

FIGURE 71
SWELL PEDAL ASSEMBLY
(123-000060),
PLUG CONNECTIONS

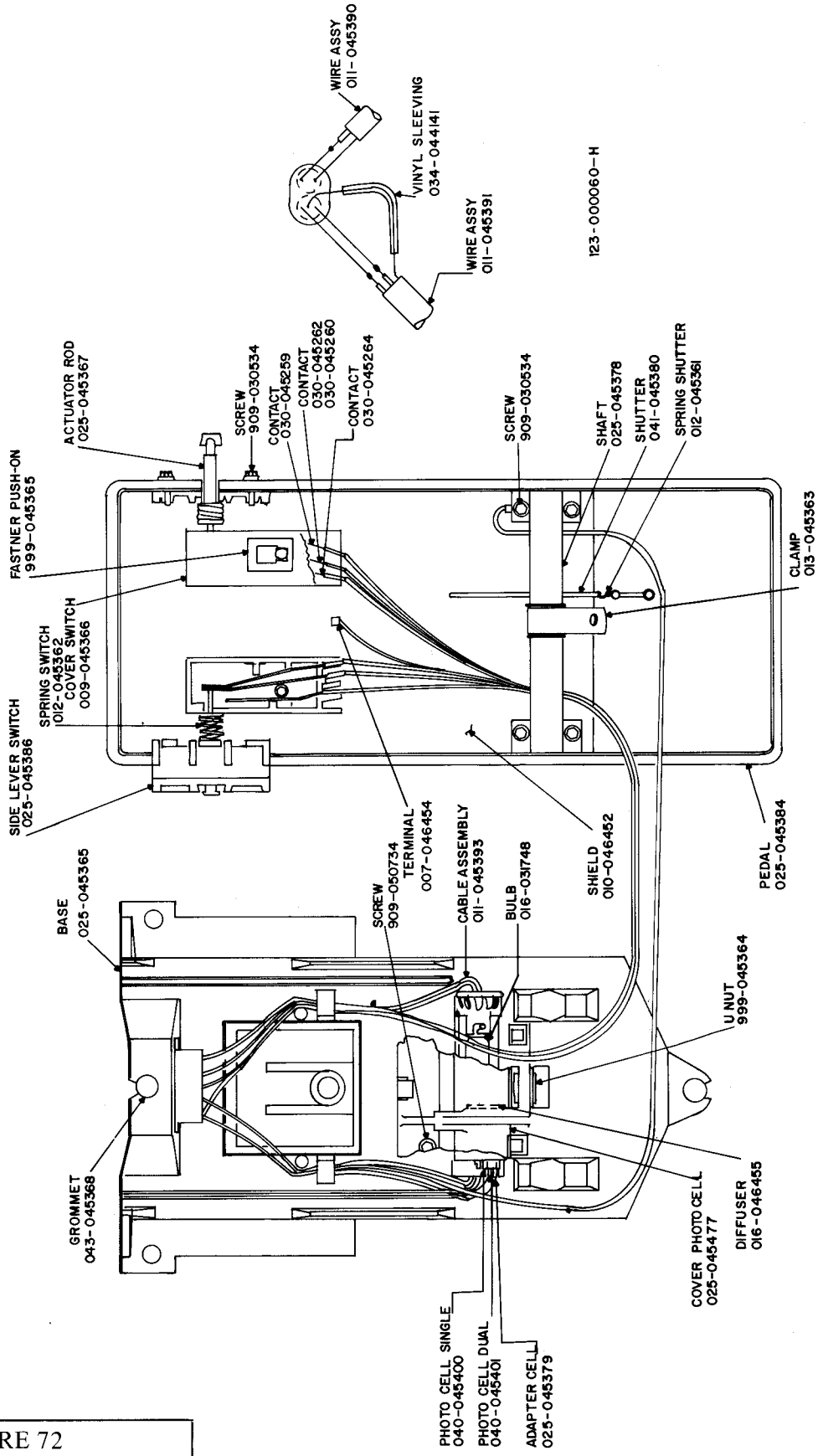


FIGURE 72
SWELL PEDAL ASSEMBLY
(123-000060) LAYOUT AND
SCHEMATIC

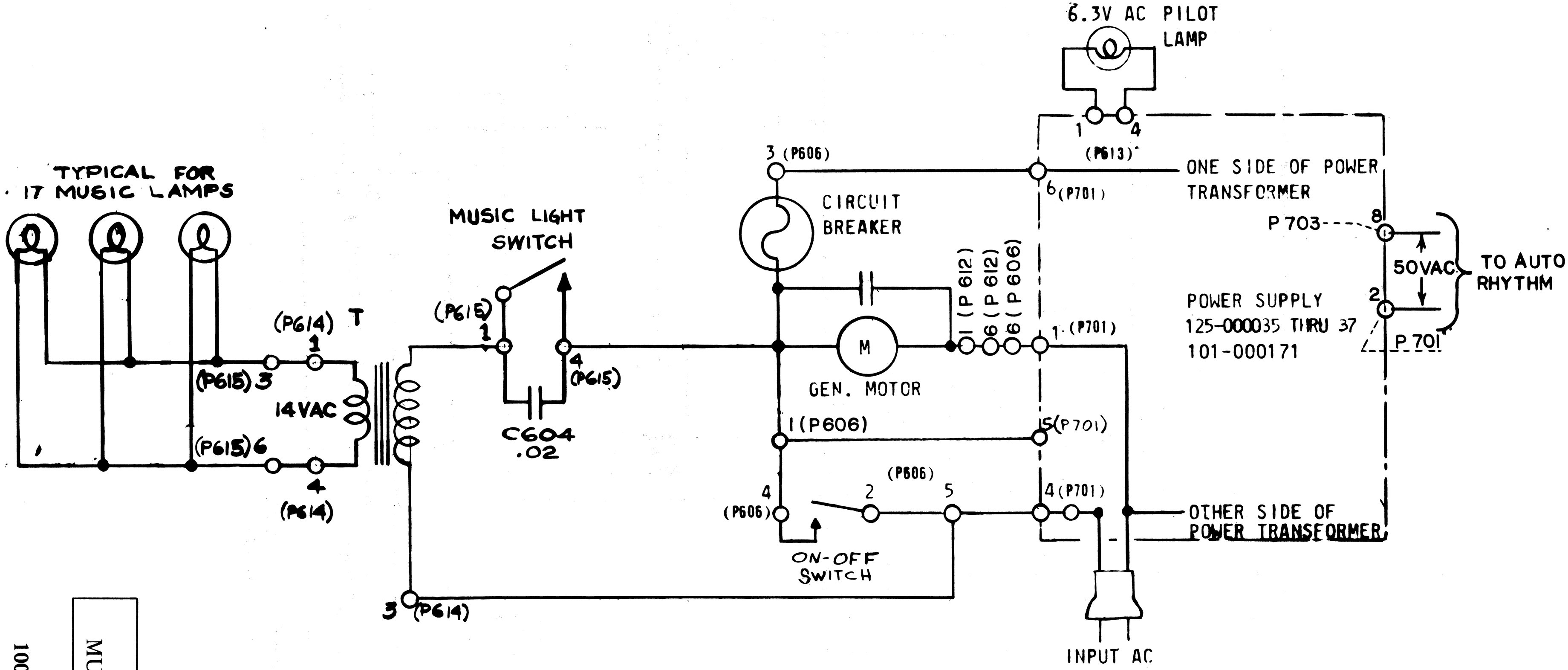


FIGURE 73
MUSIC ILLUMINATOR

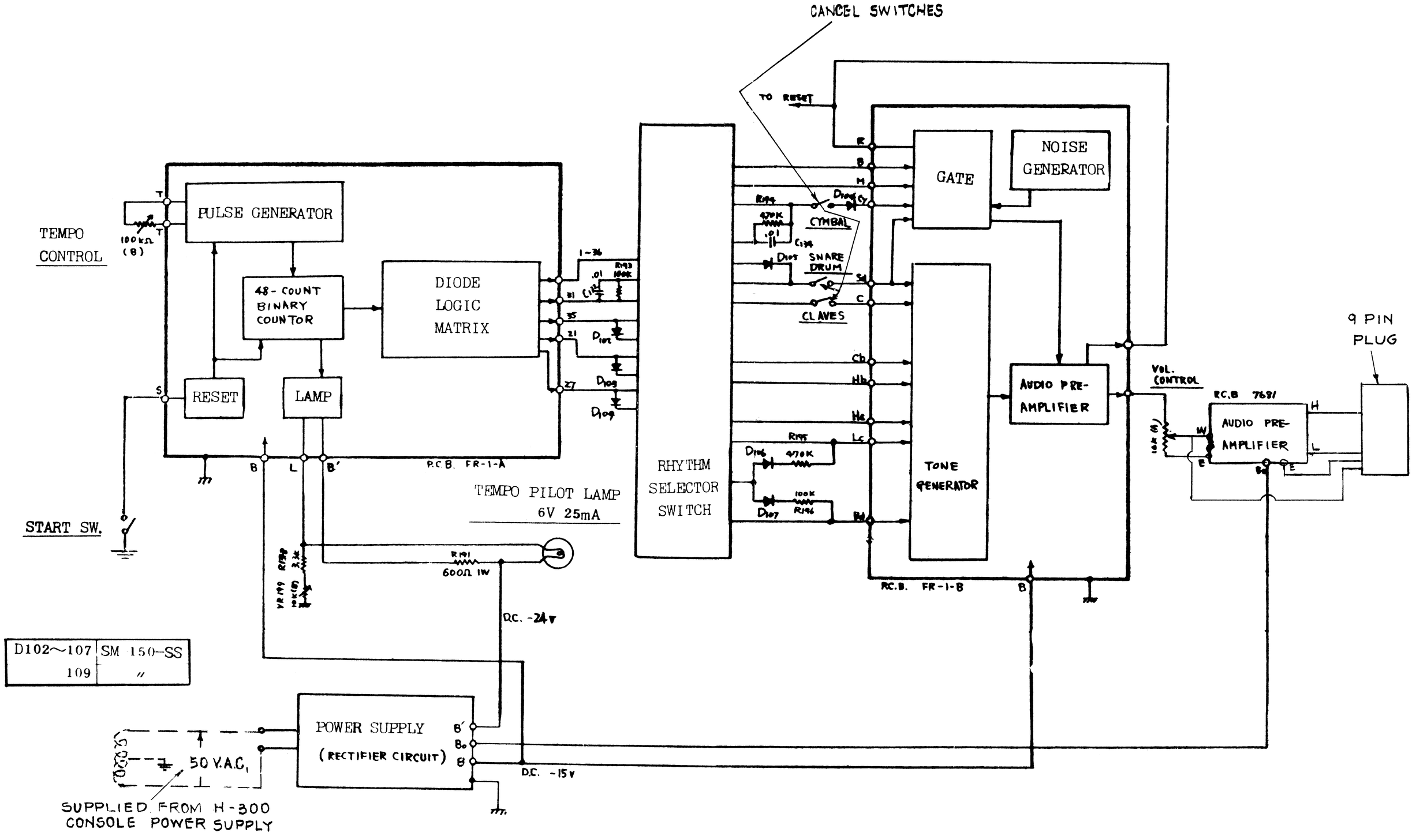
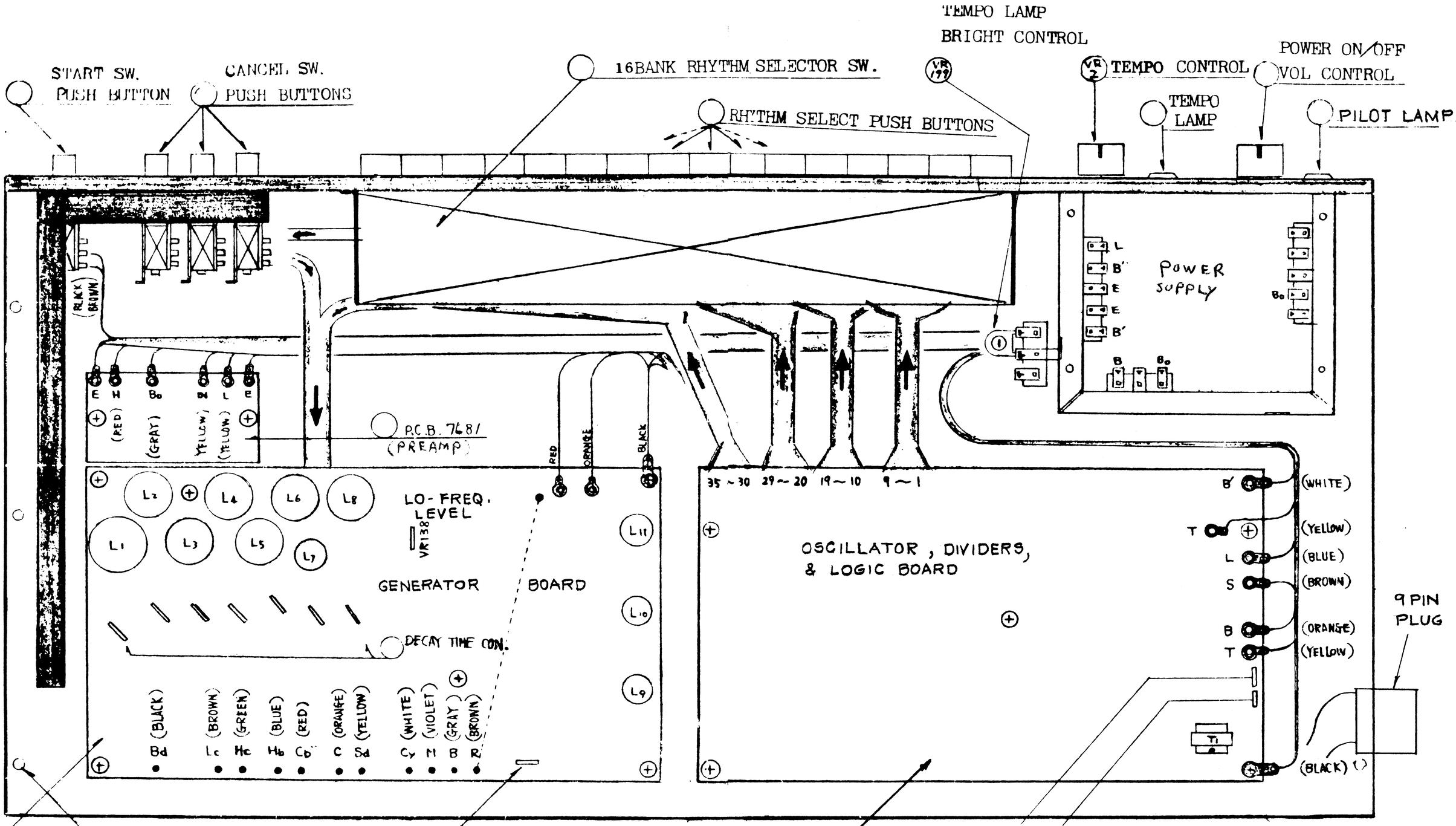
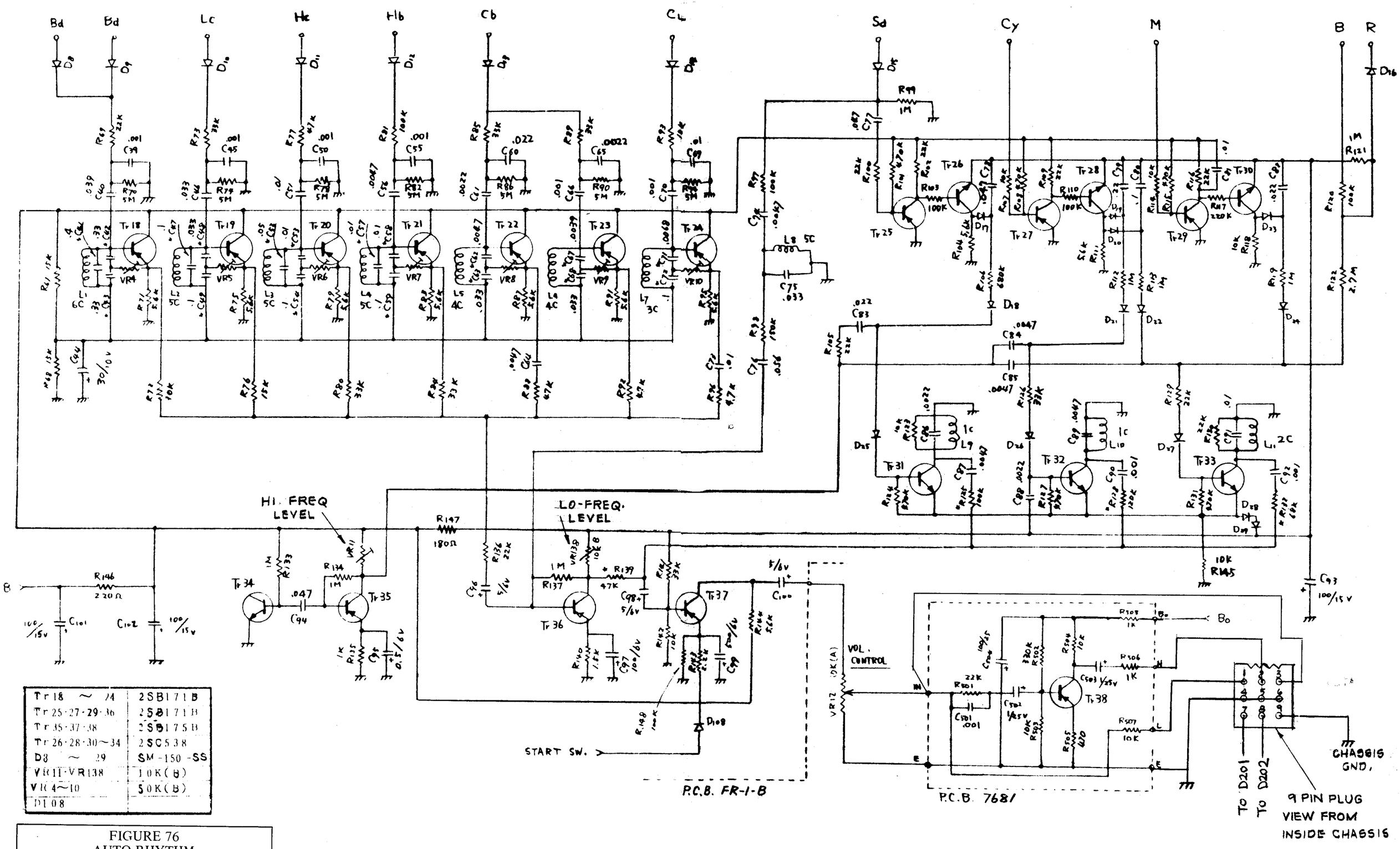


FIGURE 74
AUTO RHYTHM
BLOCK DIAGRAM



MODEL FR-2S

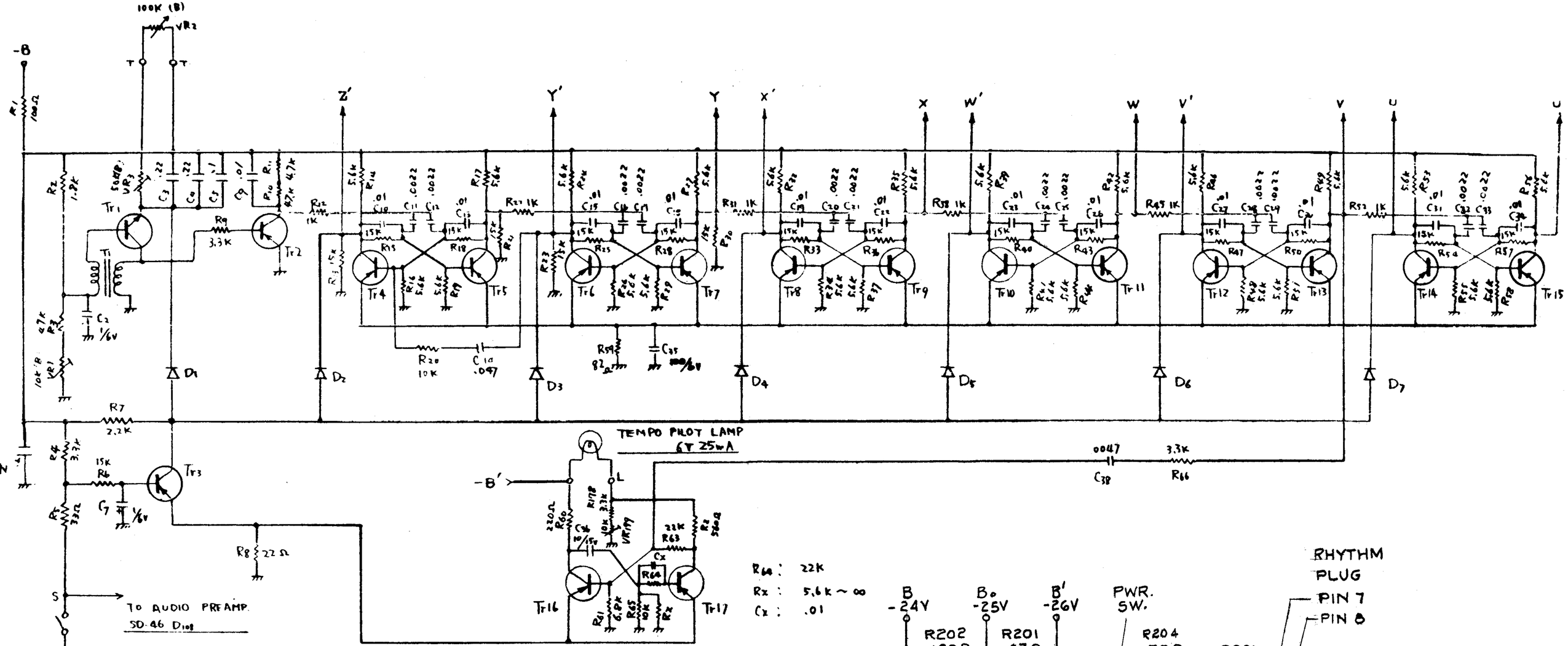
FIGURE 75
AUTO RHYTHM
PARTS LAYOUT



Tr 18 ~ 24	2SB171B
Tr 25·27·29·36	2SB171B
Tr 35·37·38	2SB175B
Tr 26·28·30~34	2SC538
D8 ~ 29	SM-150-SS
VR11·VR138	10K(B)
VR4~10	50K(B)
D108	

FIGURE 76
AUTO RHYTHM
GENERATOR & PREAMPLIFIER,
LAYOUT & SCHEMATIC

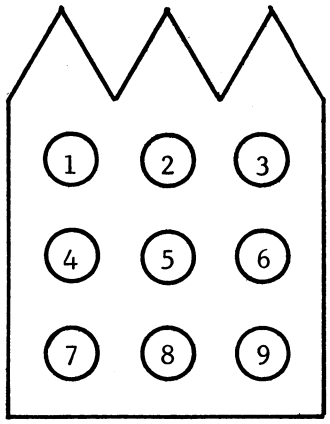
TEMPO CONTROL



Tr1	2SC538
Tr2 ~ 15	2SB171B
Tr16 ~ 17	2SB175B
D1~7, 201	SM-150-SS

FIGURE 77
AUTO RHYTHM
OSCILLATOR & DIVIDER,
LAYOUT & SCHEMATIC

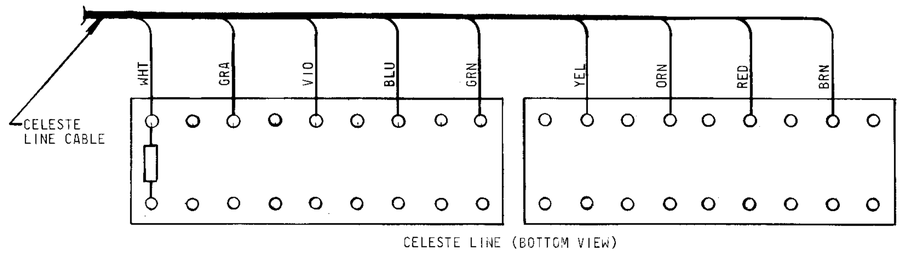
AUTO RHYTHM PLUG (P801)



PIN #	
1. COAX	TO C/P TERMINAL STRIP 1 MEG RESISTOR (LOW FREQ'S)
2. COAX	TO C/P TERMINAL STRIP 220 & 470 PFD CAPACITORS (HIGH FREQ'S)
3. BLACK/WHITE	TO PIN #8 P608 SWELL PEDAL
4. SHIELD	GROUND FOR PIN #1
5. SHIELD	GROUND FOR PIN #2
6. BLACK	TO PIN #9 P608 SWELL PEDAL
7. BROWN	TO PIN #2 P701 POWER SUPPLY (50 VAC)
8. BROWN	TO PIN #8 P703 POWER SUPPLY (50 VAC)
9. BLACK	TO GROUND OF POWER SUPPLY

FIG 5

FIGURE 78
AUTO RHYTHM
PLUG CONNECTIONS



CELESTE LINE (BOTTOM VIEW)

INSTALLATION INSTRUCTIONS

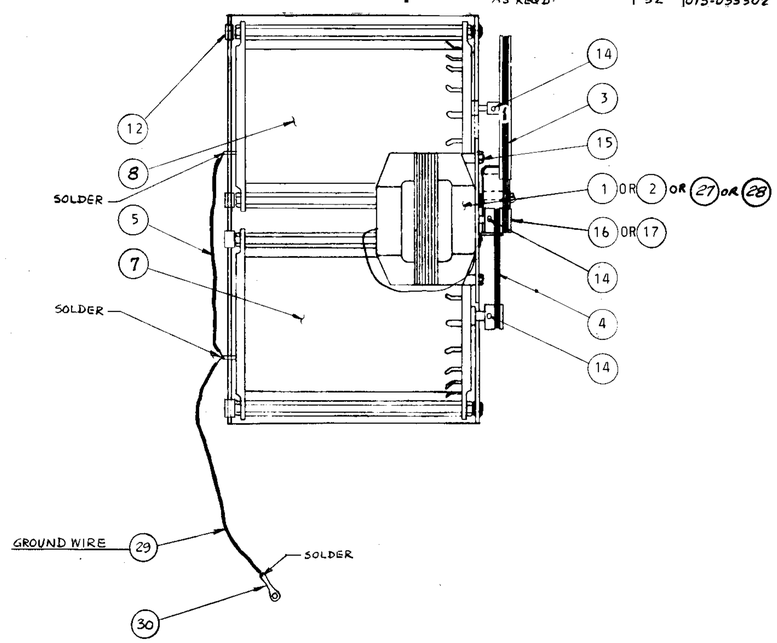
1. AFFIX TEMPLATE (047-044473) TO UNDERSIDE OF GENERATOR SHELF WITH TAPE (AT LEFT HAND END OF ORGAN AS SHOWN). DRILL FOUR (4) #43 DRILL (.089 DIA.) HOLES AS INDICATED ON TEMPLATE 1/2" DEEP IN GENERATOR SHELF. AFTER DRILLING INDICATED HOLES, DISCARD THE TEMPLATE.
2. FASTEN KIT TO UNDERSIDE OF SHELF WITH MOUNTING SCREWS AND WASHERS.
3. REMOVE PRINTED CIRCUIT BOARD COVERS. DISCONNECT SHIELDED LEADS OF EXISTING SCANNERS FROM PINS ON PRINTED CIRCUIT BOARDS. (THE EXISTING VIBRATO SCANNER IS LOCATED ON THE RIGHT HAND END OF THE GENERATOR AND THE EXISTING CELESTE SCANNER ON THE LEFT HAND END OF THE GENERATOR.) DRESS SHIELDED LEADS FROM REPLACEMENT SCANNERS THROUGH SHELF CUT-OUT AS SHOWN AND CONNECT SHIELDED LEADS TO APPROPRIATE BOARDS. (THE TWO SHIELDED LEADS OF THE CELESTE SCANNER ARE INTERCHANGEABLE ON THE TWO CELESTE AMPLIFIER BOARDS, AND THE TWO SHIELDED LEADS OF THE VIBRATO SCANNER ARE INTERCHANGEABLE ON THE TWO VIBRATO AMPLIFIER BOARDS.)
4. UNSOLDER THE COLORED LEADS OF EXISTING CELESTE SCANNER FROM THE LINE TERMINALS. BUNDLE THIS CABLE AND TWO EXISTING CELESTE SHIELDED WIRES TOGETHER AND PLACE ON A CONVENIENT LOCATION ON THE GENERATOR SHELF SO AS NOT TO INTERFERE WITH OPERATION OF GENERATOR OR ELECTRICAL FUNCTIONS OF THE ORGAN. DRESS LEADS FROM REPLACEMENT CELESTE SCANNER THROUGH SHELF CUT-OUT AS SHOWN AND SOLDER THE LEADS TO THE LINE TERMINALS, MAKING CERTAIN THAT COLOR SEQUENCE REMAINS THE SAME AS THE REMOVED WIRES. (SEE CELESTE LINE DIAGRAM.)
5. THE REPLACEMENT VIBRATO SCANNER IS CONNECTED BY UNCOUPLING THE PLUG OF THE EXISTING VIBRATO SCANNER AND INSERTING THE THE REPLACEMENT VIBRATO SCANNER PLUG IN ITS PLACE. (CAUTION: SEE NOTE "a".) BUNDLE THE TWO SHIELDED WIRES OF THE EXISTING VIBRATO SCANNER AND PLACE ON CONVENIENT LOCATION ON GENERATOR SHELF. TIE EXISTING VIBRATO CABLE TO ORGAN CABLE AT SOME CONVENIENT PLACE.
6. REMOVE THE PULLEY BELT OF THE EXISTING CELESTE SCANNER AND DRIVE SPRING OF EXISTING VIBRATO SCANNER TO IMMOBILIZE THEM.
7. CONNECT THE REPLACEMENT SCANNER MOTOR BY SOLDERING LEADS TO PINS 1 AND 6 IN PLUG 701 (POWER SUPPLY).
8. SATURATE THE FELT IN THE OIL CUP WITH GENERATOR OIL.
9. CONNECT GROUND WIRE TO GENERATOR FRAME.

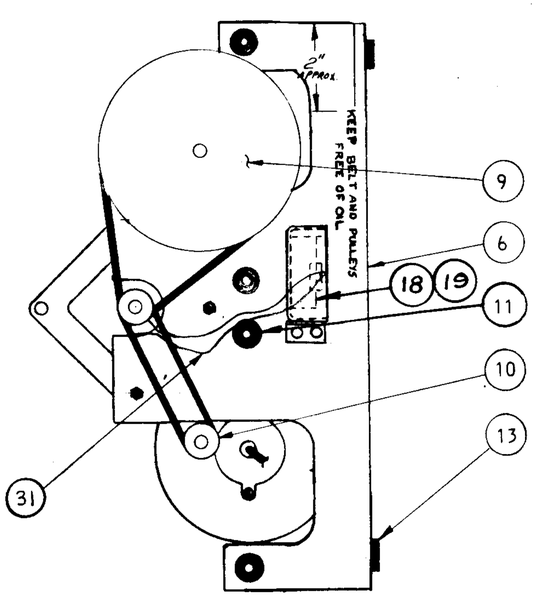
NOTES:

a. ON ORGANS OF SERIAL NUMBER 15000 OR LESS THERE IS THE POSSIBILITY OF A 32 STATION VIBRATO SCANNER. THE APPROPRIATE WIRING REVISION SHOULD BE MADE TO THE ORGAN BEFORE CONNECTING THE REPLACEMENT SCANNER KIT. THESE WIRING CHANGES CAN BE FOUND IN THE H-100 SERVICE MANUAL, H0426 DATED 2-70 ON PAGE 53D. TWO (2) CAPACITORS #425-010582 (2200 pF) ARE THE ONLY PART REQUIRED TO MAKE THIS CONVERSION.

b. NO ELECTRICAL ADJUSTMENT SHOULD BE NECESSARY. CARE SHOULD BE TAKEN TO DRESS LEADS SO THERE IS NO POSSIBILITY THAT ANY LEAD MAY EVER COME IN CONTACT WITH PULLEYS OR BELTS. PROPERLY OPERATING SCANNERS SHOULD ROTATE FREELY WITH LITTLE MECHANICAL NOISE. IF NOISE EXISTS, CORRECTION MAY BE MADE BY ADJUSTING POSITIONS OF PULLEYS. THE SCANNER SHOULD NOT BE DISASSEMBLED UNDER ANY CIRCUMSTANCES. THE HANDLING OF INTERNAL CRITICAL PARTS WOULD RESULT IN ELECTROSTATIC CHARGES THAT WOULD CREATE AN AUDIBLE HUM IN THE ORGAN. THE PHOSPHOR BRONZE GROUNDING STRAP SHOULD BE POSITIONED SO THAT IT CANNOT SHORT OUT SCANNER TERMINALS.

103-000356 120V/60HZ	103-000357 120V/50HZ	103-000358 220V/60HZ	103-000359 220V/50V	ITEM	PART NO.	PART NAME	REMARKS
1				1	021-044353	MOTOR	120V/60HZ
	1			2	021-044354	MOTOR	120V/50HZ
1	1	1	1	3	043-044441	"O" RING	CELESTE
1	1	1	1	4	043-030297	"O" RING	VIBRATO
1	1	1	1	5	252-000016-10	WIRE	
1	1	1	1	6	060-044460	BRACKET & OIL CUP ASY. ASY	
1	1	1	1	7	066-042600	VIBRATO SCANNER	
1	1	1	1	8	066-044458	CELESTE SCANNER	
1	1	1	1	9	022-042590	PULLEY	CELESTE
1	1	1	1	10	022-042589	PULLEY	VIBRATO
8	8	8	8	11	043-042867	GROMMET	
4	4	4	4	12	013-025472	"U" CLIP	
4	4	4	4	13	043-020246	GROMMET	
3	3	3	3	14	999-002034	SCREW	
3	3	3	3	15	999-001264	KEPS HEX. NUT	
1		1		16	022-044355	PULLEY	60 Hz
	1		1	17	022-044356	PULLEY	50 Hz
1	1	1	1	18	012-002996	FELT RETAINER SPRING	
1	1	1	1	19	042-002460	OIL FELT	
4	4	4	4	20	884-081534	SCREW, HEX. SLOTTED	#10
4	4	4	4	21	999-000145	WASHER	
				22	049-044571	AIR-WRAP	AS REQ'D.
1	1	1	1	23	049-025957	COIN ENVELOPE	
1	1	1	1	24	047-044476	INSTRUCTIONS	
1	1	1	1	25	047-044473	TEMPLATE	
1	1	1	1	26	049-043743	CARTON	
		1		27	021-044469	MOTOR	220V/60HZ
			1	28	021-044470	MOTOR	220V/50HZ
1	1	1	1	29	252-000038-05	WIRE	
1	1	1	1	30	007-016548	TERMINAL LUG	
20"	20"	20"	20"	31	013-025951	OILING THREAD	
AS REQ'D.				32	015-033302	SOLDER	



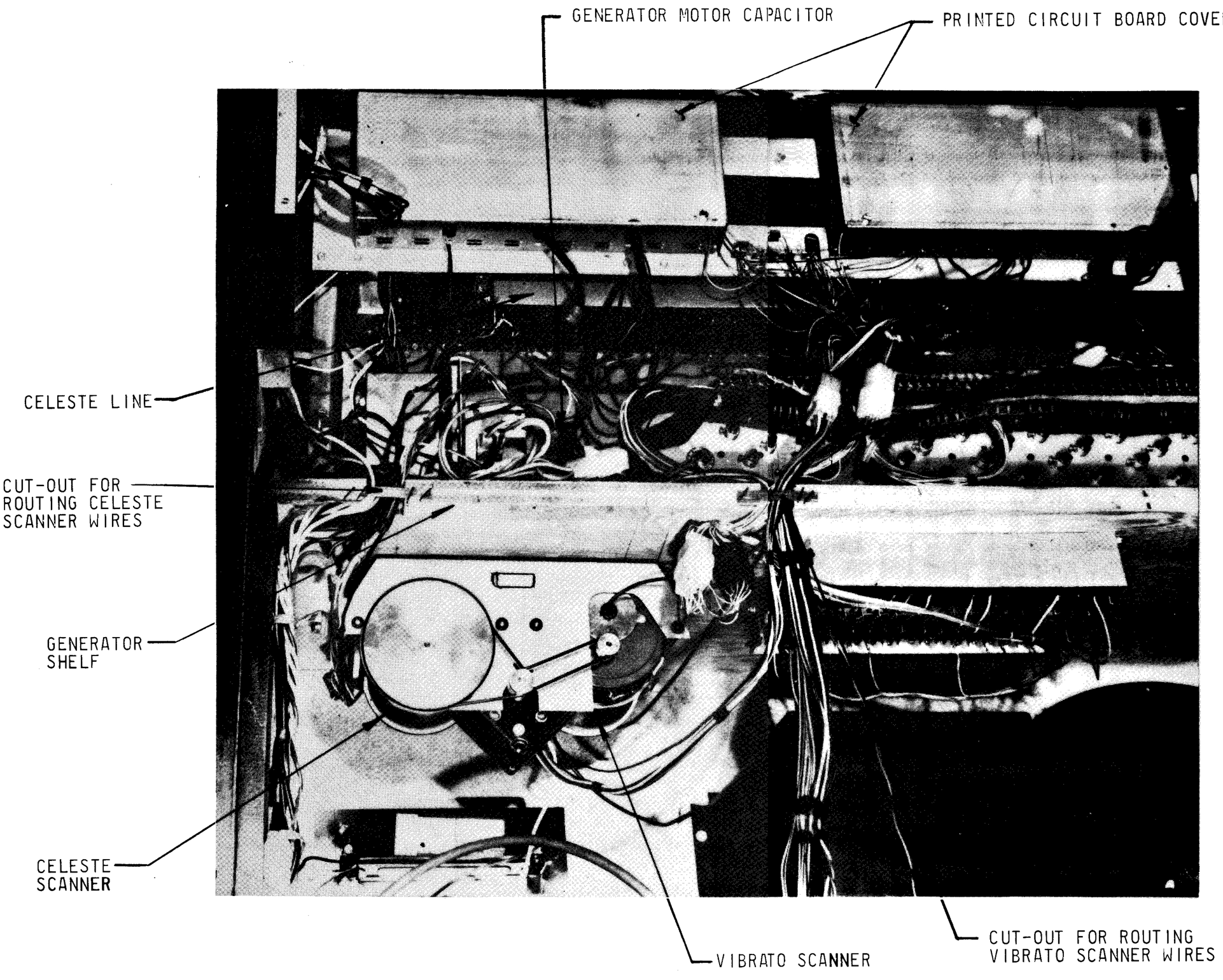


NOTES:

1. PULLEYS MUST BE ALIGNED TO PERMIT "O" RINGS (ITEMS 3 & 4) TO ROTATE IN ONE PLANE WITHOUT EXERTING THRUST ON BEARINGS.
2. LEADS MUST BE POSITIONED TO AVOID TOUCHING ANY MOVING PARTS.

4. ITEMS 20(SCREW)&21(WASHER) ARE PACKED IN ITEM 23(ENVELOPE)
5. ITEMS 22 THRU 26 TO BE PROVIDED BY ORLIAN SERVICE.
6. OIL THREAD (ITEM 31) TO BE INSERTED THROUGH FRONT AND REAR MOTOR FELTS AND LAID IN OIL CUP.

FIGURE 79
RETRO KIT INSTALLATION INSTRUCTIONS



LEFT HAND REAR VIEW OF H-SERIES ORGAN

PARTS LIST
H-SERIES ORGANS

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Switch Assembly, Rhythm and Pedal Group			4
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Switch Assembly, Vibrato Mode Group			5
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Percussion and Reiteration Driver (Below No. 15000)	125-000029		6
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Cymbal/Brush Board Assembly	124-000020		9
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Celeste Driver Amplifier Board Assembly	124-000076		10
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CONTROL PANEL ASSEMBLY (H-100) 120-000026
CONTROL PANEL ASSEMBLY (H-300) 120-000046

Stop Switch Base		041-030069
Mounting Bracket Assembly L.H.		060-030177
Mounting Bracket Assembly R.H.		035-039079
Control Panel and Catch Assembly		061-037832
Knob (Small White)		031-030590
Knob (Large White)		031-030591
Celeste Line Assembly		121-000098
Pedal Filter Choke Assembly	L1080, 1081	003-025334
Manual Matching Transformers	T1002, 1101	003-027486
AC Line Switch Assembly		008-034434
"S" Clip		013-030316
Resistor Panel Assembly		063-034280

STOP SWITCH ASSEMBLIES (DRAWBAR ASSEMBLIES)

Stop Switch Assembly (Upper)		120-000021
Mounting Block Assembly		062-037633
Cable Assembly		011-038641
Grounding Lead Assembly		011-037604
Bus Bar Lubricant		015-033388
Clamp Spring (22 Used)		012-027613
Drawbar Stop		025-040198
Contact Spring Assembly (22 Used)		030-030581
#2 Binder Head Screw (Mtg. Drawbar Stop)		846-010414
Drawbar Assembly	Brown 16'	060-034317
Drawbar Assembly	Ivory 8'	060-034319
Drawbar Assembly	Brown 5-1/3'	060-034322
Drawbar Assembly	Ivory 4'	060-034323
Drawbar Assembly	Black 2-2/3'	060-034324
Drawbar Assembly	Ivory 2'	060-034325
Drawbar Assembly	Black 1-3/5'	060-034326
Drawbar Assembly	Black 1-1/3'	060-034327
Drawbar Assembly	Ivory 1'	060-034328
Drawbar Assembly	Black I	060-034329
Drawbar Assembly	Brown II	060-034330
Numbered Drawbar Strip	(1–8)	025-027829
Drawbar Knob	Brown 16'	031-034331
Drawbar Knob	Ivory 8'	031-034333
Drawbar Knob	Brown 5-1/3'	031-034337
Drawbar Knob	Ivory 4'	031-034338
Drawbar Knob	Black 2-2/3'	031-034339
Drawbar Knob	Ivory 2'	031-034340
Drawbar Knob	Black 1-3/5'	031-034341
Drawbar Knob	Black 1-1/3'	031-034342
Drawbar Knob	Ivory 1'	031-034343
Drawbar Knob	Black I	031-034344
Drawbar Knob	Brown II	031-034345
Stop Switch Assembly (Lower)		120-000022
Mounting Block Assembly		062-037633
Cable Assembly		011-038640
Grounding Lead Assembly		011-037603
Note: For Other Parts Refer to Upper Drawbar Components		
Stop Switch Assembly (Pedal)		120-000020
Mounting Block Assembly		062-027964
Grounding Lead Assembly		011-037605
Twisted Pair Assembly (Blue/Gray)		011-030334

Manual Drawbar Assembly	Black 16'	060-034318
Drawbar Knob	Black 16'	031-034332

Note: For Other Parts Refer to Upper Drawbar Components

SWITCH ASSEMBLY (PERCUSSION GROUP NO. 1) 008-030031

Mounting Bracket			035-024351
Switch Panel and Bracket Assembly		(Chimes)	008-027668
Switch Panel and Bracket Assembly		(Glock)	008-030040
Switch Panel and Bracket Assembly		(Touch Control)	008-027670
Switch Panel and Bracket Assembly		(Second Voice)	008-030041
Shaft			020-037239
Tubular Clip			013-028002
Overcenter Spring			012-038938
Limit Spacer			044-030602
Resistor	8.2K	R1016	600-020711
Resistor	5.6K	R1017	600-020671
Resistor	470K	R1015	600-021131
Resistor 5%	1.5Meg	R1013	600-021252
Resistor	1Meg	R1014	600-021211
Control Tab		SECOND VOICE	031-037615
Control Tab		TOUCH CONTROL	031-037616
Control Tab		CHIMES	031-037534
Control Tab		GLOCK	031-037617
Control Tab		CELESTA (H-262)	031-037562

SWITCH ASSEMBLY (PERCUSSION GROUP NO. 2) 008-030035

Mounting Bracket			035-027931
Switch Panel and Bracket Assembly		(Banjo)	008-030047
Switch Panel and Bracket Assembly		(Add Vibrato)	008-027670
Switch Panel and Bracket Assembly		(Marimba-Xylo)	008-030040
Switch Panel and Bracket Assembly		(Guitar)	008-027668
Switch Panel and Bracket Assembly		(Reit.-Harp Sust.)	008-030044
Shaft			020-027925
Tubular Clip			013-028002
Overcenter Spring			012-038938
Limit Spacer (White Plastic)			044-030602
Resistor	220K	R1024	600-021051
Resistor	150K	R1025	600-021011
Control Tab		GUITAR	031-037535
Control Tab		MARIMBA	031-037536
Control Tab		XYLOPHONE	031-037537
Control Tab		BANJO	031-037538
Control Tab		REITERATE	031-037539
Control Tab		HARP SUSTAIN	031-037540
Control Tab		ADD VIBRATO	031-037541
Control Tab		NAZARD } H-262	031-040326
Control Tab		BELLS } H-262	031-040327

SWITCH ASSEMBLY (RHYTHM AND PEDAL GROUP) 008-030036

Mounting Bracket		035-027931
Switch Panel and Bracket Assembly (String Bass I and II)		008-030039
Switch Panel and Bracket Assembly (Cymbal, Brush Upper and Lower)		008-027670
Shaft		020-027928
Tubular Clip		013-028002
Harp Coupling Transformer Assembly	T1103	003-030305
Overcenter Spring		012-038938
Limit Spacer		044-030602

Resistor	10K	R1004		600-020731
Resistor	82K	R1012		600-020951
Resistor	18K	R1010		600-020791
Resistor	22K	R1003		600-020811
Resistor	100K	R1100, 1101		600-020971
Resistor	56K	R1011		600-020911
Capacitor	20mfd 50v	C1003, 1004		407-080048
Capacitor	.22mfd	C1005		412-010532
Diode		D1100, 1101		001-026010
Control Tab		CYMBAL-PEDAL		031-037542
Control Tab		BRUSH-UPPER		031-037618
Control Tab		BRUSH-LOWER		031-037543
Control Tab		STRING BASS I		031-037619
Control Tab		STRING BASS II		031-037620
Control Tab		PEDAL SUSTAIN I	H-262	031-040328
Control Tab		PEDAL SUSTAIN II	H-262	031-040329

VIBRATO SWITCH ASSEMBLY 125-000014

Switch Panel and Bracket Assembly (2 Used)				008-027670
Terminal Strip Assembly				006-022173
Actuator (3 Used)				025-030660
Felt Stop				042-030663
Bus (7 Used)				029-030666
Extension Spring (1 Used)				012-030668
Overcenter Spring (For On-Upper, On-Lower)				012-038938
Overcenter Spring (For Vibrato I, Vibrato II)				012-038939
Limit Spacer (White Plastic Piece)				044-030602
Shaft				020-037239
Tubular Clip				013-028002
Felt Stop				042-030743
Control Tab		ON - UPPER		031-037528
Control Tab		ON-LOWER		031-037529
Control Tab		VIBRATO I		031-037621
Control Tab		VIBRATO II		031-037622
Control Tab		ON - SWELL	H-262	031-037559
Control Tab		ON - GREAT	H-262	031-037560
Resistor	8.2K	R1030		600-020711
Resistor	330K	R1028		600-021091

SWITCH ASSEMBLY (VIBRATO MODE GROUP) 008-030032

Mounting Bracket			035-024205
Switch Panel and Bracket Assembly (Celeste)			008-030039
Switch Panel and Bracket Assembly (Chorus)			008-030043
Switch Panel and Bracket Assembly (Dual Vibrato)			008-030042
Shaft			020-037288
Tubular Clip			013-028002
Limit Spacer (White Plastic)			044-030602
Overcenter Spring			012-038938
Resistor	15K	R1050	600-020771
Resistor	220K	R1044, 1048, 1049	600-021051
Resistor	270K	R1045, 1046, 1031, 1032	600-021071
Resistor	470K	R1047	600-021131
Control Tab		DUAL VIBRATO	031-037623
Control Tab		CHORUS	031-037624
Control Tab		CELESTE	031-037625

Resistor	10K	R1004		600-020731
Resistor	82K	R1012		600-020951
Resistor	18K	R1010		600-020791
Resistor	22K	R1003		600-020811
Resistor	100K	R1100, 1101		600-020971
Resistor	56K	R1011		600-020911
Capacitor	20mfd 50v	C1003, 1004		407-080048
Capacitor	.22mfd	C1005		412-010532
Diode		D1100, 1101		001-026010
Control Tab		CYMBAL-PEDAL		031-037542
Control Tab		BRUSH-UPPER		031-037618
Control Tab		BRUSH-LOWER		031-037543
Control Tab		STRING BASS I		031-037619
Control Tab		STRING BASS II		031-037620
Control Tab		PEDAL SUSTAIN I	H-262	031-040328
Control Tab		PEDAL SUSTAIN II	H-262	031-040329

VIBRATO SWITCH ASSEMBLY 125-000014

Switch Panel and Bracket Assembly (2 Used)				008-027670
Terminal Strip Assembly				006-022173
Actuator (3 Used)				025-030660
Felt Stop				042-030663
Bus (7 Used)				029-030666
Extension Spring (1 Used)				012-030668
Overcenter Spring (For On-Upper, On-Lower)				012-038938
Overcenter Spring (For Vibrato I, Vibrato II)				012-038939
Limit Spacer (White Plastic Piece)				044-030602
Shaft				020-037239
Tubular Clip				013-028002
Felt Stop				042-030743
Control Tab		ON - UPPER		031-037528
Control Tab		ON-LOWER		031-037529
Control Tab		VIBRATO I		031-037621
Control Tab		VIBRATO II		031-037622
Control Tab		ON - SWELL	H-262	031-037559
Control Tab		ON - GREAT	H-262	031-037560
Resistor	8.2K	R1030		600-020711
Resistor	330K	R1028		600-021091

SWITCH ASSEMBLY (VIBRATO MODE GROUP) 008-030032

Mounting Bracket			035-024205
Switch Panel and Bracket Assembly (Celeste)			008-030039
Switch Panel and Bracket Assembly (Chorus)			008-030043
Switch Panel and Bracket Assembly (Dual Vibrato)			008-030042
Shaft			020-037288
Tubular Clip			013-028002
Limit Spacer (White Plastic)			044-030602
Overcenter Spring			012-038938
Resistor	15K	R1050	600-020771
Resistor	220K	R1044, 1048, 1049	600-021051
Resistor	270K	R1045, 1046, 1031, 1032	600-021071
Resistor	470K	R1047	600-021131
Control Tab		DUAL VIBRATO	031-037623
Control Tab		CHORUS	031-037624
Control Tab		CELESTE	031-037625

SWITCH ASSEMBLY (ORGAN GROUP) 008-030034

Mounting Bracket			035-027931
Switch Panel and Bracket Assembly (Reverb II)			008-030038
Switch Panel and Bracket Assembly (Rev. I and Vol. Soft)			008-027673
Switch Panel and Bracket Assembly (Echo Only)			008-030039
Switch Panel and Bracket Assembly (Main and Echo)			008-027676
Shaft			020-027928
Tubular Clip			013-028002
Overcenter Spring			012-038938
Limit Spacer (White Plastic)			044-030602
Resistor	10K	R1056, 1059	600-020731
Resistor	100K	R1057	600-020971
Resistor	2.2Meg	R1063, 1064	600-021291
Resistor	33K	R1060	600-020851
Resistor	47K	R1061	600-020891
Capacitor	390pf	C1002	425-010392
Resistor & Capacitor Panel			063-030343
Control Tab		REVERB I	031-037626
Control Tab		REVERB II	031-037627
Control Tab		ECHO ONLY	031-037628
Control Tab		MAIN AND ECHO	031-037629
Control Tab		VOLUME SOFT	031-037550

H-SERIES PILOT LIGHT ASSEMBLY

Lamp Holder Assembly	016-034442
Plastic Cap	025-024968
Push on Clip	013-031468
Pilot Light Lens	016-031454
Lamp	016-022885
Felt Washer	042-020820

PERCUSSION AND REITERATION DRIVER (BELOW SERIAL NO. 15000) 125-000029

Chassis Pan Assembly				009-028719
Filter Choke Assembly			L201	003-037671
Transformer Assembly			T201	003-037287
Potentiometer Dual		100K-100K	R208, 216	676-000266
Potentiometer		1Meg	R210	676-000101
Transistor			Q201, 202	001-021133
Diode			D201	001-026010
Diode, Zener	6.2volt	10%	D202	001-023033
Resistor	3.3K		R217	600-020611
Resistor	100K		R202, 203, 204, 214	600-020971
Resistor	33K		R205	600-020851
Resistor	10K		R206, 201	600-020731
Resistor	18K		R207	600-020791
Resistor	47K		R215	600-020891
Capacitor	10000pf		C201	425-010752
Capacitor	3900pf		C202	425-010642
Capacitor	1mfd		C203	407-060119
Capacitor	1mfd		C204	406-010292
Capacitor	1000pf		C205	425-010502

PERCUSSION AND REITERATION DRIVE ASSEMBLY 128-000001 (ABOVE # 15000)

Chassis Pan	041-031549
Miniature Terminal Strip Assembly 5 Lug	006-031552
Miniature Terminal Strip Assembly 12 Lug	006-031553

Filter Choke Assembly			L201	003-037670
Potentiometer (Dual Construction)			R-217, 218 Dual 500K	676-000267
Shake Proof Lockwasher				999-000801
Capacitor	.1mfd		C201	413-010142
Capacitor, Tantalum	1mfd		C203	414-040092
Resistor	3300Ω	5%	R216	600-020612
Resistor	22Ω		R209	600-020091
Resistor	470Ω		R214	600-020411
Resistor	2700Ω	5%	R213	600-020592
Resistor	3300Ω		R218 (Part of Brush and Cymbal Circuit)	600-020611
Resistor	10K		R201, 204, 215	600-020731
Resistor	15K		R208	600-020771
Resistor	33K		R206	600-020851
Resistor	47K		R205, 219, 220 (On Control for Brush and Cymbal)	600-020891
Resistor	100K		R202, 207	600-020971
Resistor	220K		R203	600-021051
Resistor	100K	5%	R212	600-020972
Transistor			Q201, 202, 203, 204, 205, 206, 207	001-021135
Silicon Control Switch			D205	001-026050
Zener Diode			D201	001-023033
Diode			D202, 204	001-026010
Wire and Plug Assembly				011-031555

DELAY GATE BOARD ASSEMBLY 124-000019 (ABOVE #15000)

PWB and Pin Assembly				023-034738
Resistor	10K		R958	600-020731
Resistor	12K		R957	600-020751
Resistor	100K		R951, 952, 953, 954, 956	600-020971
Resistor	5%	82K	R955	600-020952
Capacitor Electrolytic		8mfd 25v	C952	407-060129
Capacitor Electrolytic		80mfd 25v	C951	407-060259
Diode, Zener	15volt	10%	D952	001-023034
Diode, Silicon Rectifier			D951	001-024050
Field Effect Transistor (N-Channel)			Q952, 953, 954, 955	001-027030
Transistor			Q951	001-021133

UPPER MANUAL ASSEMBLY 119-000044

Manual Frame Assembly		060-030088
Top Cover Assembly		060-037591
Key Comb Assembly (12 Key)		057-043081
Key Comb Assembly (13 Key)		057-043082
Key Comb Assembly (Preset)		057-043080
Preset Assembly Components		
Up Stop Bracket Assembly		060-030014
Pivot and Spring Plate Assembly (L.H.)		060-030022
Pivot Plate Assembly (R.H.)		060-032609
Cancellation Bar and Pivot Assembly		060-028785
Spring		012-002560
End Block (R.H.)		025-027748
End Block (L.H.)		025-027749
Screw (Mtg. End Block)		831-100914
Front Strip		061-027746
Screw (Mtg. Front Strip)		938-050318
Plug (12 Connection)	White	005-039830
Plug (12 Connection)	Red	005-039832
Natural Key C		025-042279
Natural Key D		025-042280

Natural Key	E		025-042281
Natural Key	F		025-042282
Natural Key	G		025-042283
Natural Key	A		025-042284
Natural Key	B		025-042285
Natural Key	CX		025-042286
Short Black Playing Key			025-032672
H-100/300 Preset Keys (Upper)			
CANCEL			025-042781
TIBIAS 8' AND 2'			025-042782
NOVEL SOLO			025-042783
THEATER SOLO		BLACK	025-042784
FULL TIBIAS			025-042785
FULL THEATER BRASS			025-042786
UPPER DRAWBARS AND PERCUSSION			025-042787
FRENCH HORN 8'			025-038601
CLARINET 8'			025-038602
OBOE HORN 8'		WHITE	025-038603
TRUMPET 8'			025-038604
DRAWBARS			025-038605
H-262 Preset Keys (Upper)			
CANCEL			025-042781
DULCIANA 8'			025-042788
SALICIONAL 8'			025-042841
FLUTES 8' AND 4'		BLACK	025-042842
SWELL DIAPASON 8'			025-042843
FULL SWELL 16'			025-042844
SWELL DRAWBAR AND PERCUSSION			025-042845
STOPPED FLUTES 8'			025-040343
FRENCH HORN 8'			025-038601
OBOE HORN 8'		WHITE	025-038603
TRUMPET 8'			025-038604
DRAWBARS			025-038605
Bracket and Key Channel Assembly			060-033392
Preset Bracket and Key Channel			057-038496
Screw (Mtg Keys)			850-000002
Upstop Felt (In Key Channel)			042-024187

LOWER MANUAL ASSEMBLY 119-000043

Manual Frame Assembly			060-030087
Top Cover Assembly			060-037590
Plug (12 Pin, Female)	Brown		005-039831
Plug (12 Pin, Female)	Green		005-039835
H-100/300 Preset Keys (Lower)			
CANCEL			025-042781
DULCIANA			025-042788
VOX 8' AND TIBIA 4'			025-042789
STRING ACCOMPANIMENT		BLACK	025-042790
FULL ACCOMPANIMENT 8'			025-042791
BOMBARDE			025-042792
LOWER DRAWBARS			025-042793
CELLO			025-038606
VIBRAHARP			025-038607
OPEN DIAPASON		WHITE	025-038608
TIBIA			025-038609
DRAWBARS			025-038610

H-262 Preset Keys

CANCEL		025-042871
FLUTE AND STRINGS 8'	BLACK	025-042846
DIAPASON AND FLUTES 8'		025-042847
GREAT NO REEDS 8'		025-042848
FULL GREAT 8'		025-042849
FULL GREAT WITH 16'		025-042850
GREAT DRAWBARS		025-042851
CELLO 8'	WHITE	025-038606
CLARINET 8'		025-038602
OPEN DIAPASON 8'		025-038608
TIBIA CLAUSA 8'		025-040344
DRAWBARS		025-038610

NOTE: For Other Common Components, Refer to Upper Manual Assembly

PEDAL SWITCH ASSEMBLIES

Pedal Switch Assembly Below #15000	116-000020
Pedal Switch Assembly Above #15000	116-000025
Top Cover Assembly	060-030398
Bottom Cover Assembly	060-030459
End Cover	041-015556
Adhesive-Backed Felt	042-035143
Pedal Pusher Pin Felt	042-030742
Switch Plate Assembly	060-030457
Doughnut Spacer (In Solenoid)	043-030434
Actuator Assembly	060-030427
Solenoid Assembly (Single Coil–Single Bracket)	003-038693
Solenoid Assembly (Double Coil–Double Bracket)	003-038694
Solenoid Assembly (Single Coil–Double Bracket)	003-038695
Pedal Bus Bar	029-030413
Button Actuator	025-030376
Diode (25 Used) Commercial 1N3604)	001-026030

CYMBAL/BRUSH BOARD ASSEMBLY 124-000020

Printed Wiring Board				023-032934
Pin Connector				007-028499
Resistor	47Ω	R905, 916		600-020171
Resistor	390Ω	R920		600-020391
Resistor	10K	R907, 918		600-020731
Resistor	100K	R902, 909		600-020971
Resistor	220K	R911		600-021051
Resistor	1Meg	R901, 910, 912, 914		600-021211
Resistor	2.2Meg	R908		600-021291
Resistor	3.3Meg	R904		600-021331
Resistor	3.9Meg	R903		600-021351
Resistor	5.6Meg	R915		600-021391
Resistor	150Ω	R919		600-020291
Resistor	6.8Meg	R921		600-021411
Capacitor, Mylar	.01mfd	100v	C901, 904, 906, 907, 908, 911, 912, 914	413-110072
Capacitor, Mylar	.1mfd	100v	C910	413-110142
Capacitor, Mylar	.33mfd	100v	C909	413-110172
Capacitor, Mylar	.05mfd	100v	C902	413-110212
Capacitor, Disc	.00068mfd		C903	426-010462
Capacitor, Disc	.0047mfd		C905	426-010663
Capacitor, Electrolytic		80mfd 25v	C913	407-060259
Potentiometer	50K	R906, 917		676-000019

Potentiometer	250K	R913		676-000027
Potentiometer	20K	R922		676-000015
Coil Assembly		L901, 902		003-030753
Filter Choke Assembly		L903		003-027183
Diode		D901, 902, 904, 905		001-026010
Transistor		Q901		001-021133
Transistor		Q902, 905, 906		001-021134
Transistor		Q903		001-021135
Noise Transistor		Q904 (Clip Collector Lead)		001-021211

CELESTE RECOVERY AMPLIFIER BOARD ASSEMBLY (2 USED) 124-000074

Printed Wiring Board and Terminal Assembly				023-038638
Resistor	390Ω	R845		600-020391
Resistor	10K	R842, 844		600-020731
Resistor	100K	R843, 847		600-020971
Resistor	470K	R840		600-021131
Resistor	680K	R841		600-021171
Resistor	6.8Meg	R839		600-021411
Resistor	220Meg	R838		600-021500
Resistor 1Watt	15K	R846		600-030771
Resistor	39K	R848		600-020871
Capacitor	1mfd	100v	C826, 824	420-010113
Capacitor Electrolytic	10mfd	15v	C825	407-040199
Capacitor Ceramic		270pf	C822	425-010352
Capacitor Ceramic		.01mfd	C823	425-010752
Transistor		Q808		001-021133
Transistor		Q807		001-021090
Transistor		Q809		001-021100

CELESTE DRIVER AMPLIFIER BOARD ASSEMBLY 124-000076

PWB and Terminal Assembly				023-038639
Resistor		470Ω	R856	600-020411
Resistor		10K	R854	600-020731
Resistor		47K	R859	600-020891
Resistor		100K	R855, 858	600-020971
Resistor		15K	R857	600-030771
Resistor		180K	R853	600-021031
Capacitor	1mfd	100v	C833	420-010113
Capacitor	1000mfd	25v	C840	407-060149
Capacitor	10mfd	15v	C832	407-040199
Transistor			Q810	001-021100

NON–VIBRATO PREAMPLIFIER BOARD ASSEMBLY 124-000073

Printed Wiring Board				023-039701
Resistor		150Ω	R812	600-020291
Resistor		680Ω	R813	600-020451
Resistor		560Ω	R806	600-020431
Resistor		1K	R802	600-020491
Resistor		10K	R803	600-020731
Resistor		22K	R804, 807	600-020811
Resistor		39K	R809, 810	600-020871
Resistor		100K	R815	600-020971
Resistor		150K	R805	600-021011
Resistor		1Meg	R811	600-021211
Resistor	1 Watt	22K	R814	600-030811
Capacitor	1mfd	100v	C804, 806	420-010113
Capacitor Electrolytic	2.2mfd	10v	C803	414-020112

Transistor		Q808	001-021133
Transistor		Q807	001-021090
Transistor		Q809	001-021100

VIBRATO RECOVERY AMPLIFIER BOARD ASSEMBLY (2 USED) 124-000100

Printed Wiring Board and Terminal Assembly					023-038638
Resistor		470Ω		R845	600-020411
Resistor		10K		R842, 844	600-020731
Resistor		100K		R843, 847	600-020971
Resistor		470K		R840	600-021131
Resistor		680K		R841	600-021171
Resistor		6.8Meg		R839	600-021411
Resistor		15K	1 Watt	R846	600-030771
Resistor		3.9Meg		R838	600-021351
Resistor		39K		R842	600-020871
Capacitor	2200pf			C822	425-010582
Capacitor	1mfd	100v		C824, 826	420-010113
Capacitor Electrolytic	10mfd	15v		C825	407-040199
Capacitor Ceramic	.01mfd			C823	425-010752
Transistor				Q808	001-021133
Transistor				Q807	001-021090
Transistor				Q809	001-021100

HARP SUSTAIN KEYER ASSEMBLY 124-000116

Keyer Rack Assembly					050-040206
Harp Signal Cable					011-041474
Printed Wiring Board Assembly (Harp Keyer and Preamplifier)					124-000050
Printed Wiring Board					023-039579
Resistor	330Ω			R525	600-020371
Resistor	680Ω			R541	600-020451
Resistor	1K			R504(5Used)	600-020491
Resistor	1.5K			R513, 529	600-020531
Resistor	2.2K			R501(5 Used)	600-020571
Resistor	4.7K			R516, 521	600-020651
Resistor	6.8K			R511, 512, 514	600-020691
Resistor	10K			R503 (5 Used), 526	600-020731
Resistor	68K			R524	600-020931
Resistor	39K			R515	600-020871
Resistor	47K			R502(5Used)	600-020891
Resistor	150K			R523, 528	600-021011
Resistor	220K			R527	600-021051
Resistor	470K			R522	600-021131
Resistor	33Ω	5%		R518	600-020132
Resistor	2.7K	5%		R517, 540	600-020592
Capacitor	.068mfd			C521	406-010122
Capacitor	.1mfd			C513	406-010142
Capacitor Electrolytic	2mfd		25v	C522	407-060109
Capacitor Electrolytic	15mfd		20v	C501(5Used)	407-050169
Capacitor	.01mfd			C511	413-110072
Capacitor	.1mfd			C524	413-110142
Capacitor	3900pf			C512	425-010642
Capacitor Electrolytic	5mfd		20v	C502(5Used)	407-060099
Potentiometer	10K			R530	676-000014
Transistor				Q501 (5 Used), 521, 522	001-021133

Harp Keyer Board Assembly (2 Used)						124-000046
Printed Wiring Board						023-039576
Pin (PWB)						007-028499
Resistor	47K		R502		11 Each Used	600-220891
Resistor	1K		R504			600-220491
Resistor	10K		R503			600-220731
Resistor	2.2K		R501			600-220571
Capacitor	15mfd	20v	C501			407-050169
Transistor			Q501, 502			001-021133
Harp Keyer Board Assembly (2 Used)						124-000047
Printed Wiring Board						023-039576
Resistor	47K		R502		11 Each Used	600-220891
Resistor	1K		R504			600-220491
Resistor	10K		R503			600-220731
Resistor	2.2K		R501			600-220571
Capacitor Electrolytic		15mfd	20v	C501		407-050169
Capacitor Electrolytic		8mfd	25v	C502		407-060129
Transistor			Q501			001-021133

PERCUSSION GATE AMPLIFIER ASSEMBLY 117-000001 (ABOVE #15000)

Chassis Pan					041-031510
Percussion Transformer and Plug Assembly				T101	063-038635
Wire and Plug Assembly				P103	011-031564
Mounting Clip (For PW Board)					025-031671
Potentiometer	100K	R113			676-000105
Potentiometer	10K	R112			676-000143
Percussion Gate Amplifier Board Assembly					124-000003
Printed Wiring Board and Pin Assembly					023-031523
Capacitor Mylar		1mfd	100v	C104	420-010113
Capacitor Mylar		.02mfd	100v	C107	413-010312
Capacitor Electrolytic		100mfd	50v	C102	407-080069
Capacitor Electrolytic		500mfd	5v	C108	407-010279
Capacitor Mylar		.1mfd	100v	C101, 105	413-110142
Capacitor Mylar		.22mfd	100v	C106	413-110162
Capacitor Tantalum		1mfd	25v	C103	414-040092
Resistor	820Ω		R117		600-020471
Resistor	1K		R120		600-020491
Resistor	1.2K		R106		600-020511
Resistor	2.7K		R101		600-020591
Resistor	6.8K		R109		600-020691
Resistor	10K		R104, 111, 118		600-020731
Resistor	15K		R110		600-020771
Resistor	47K		R102, 105, 107, 116		600-020891
Resistor	100K		R115, 121		600-020971
Resistor	82K		R108		600-020951
Resistor	150K		R103		600-021011
Resistor	330K		R114		600-021091
Resistor	82Ω	5%	R119		600-020232
Potentiometer	100K		R122		676-000023
Transistor			Q101, 103, 104		001-021070
Field Effect Transistor			Q102		001-027010

PEDAL GATE AND AMPLIFIER ASSEMBLY 117-000004 (ABOVE #15000)

Chassis Pan					041-031592
Pedal Gate Matching Transformer			T-151		003-031598
Wire and Plug Assembly			P-151		011-031591
Potentiometer	100K		R-164		676-000105
Potentiometer	10K		R-161		676-000143
Mounting Clip (PW Board)					025-031671
Pedal Gate Amplifier Board Assembly					124-000008
Printed Board and Pin Assembly					023-031597
Resistor		120Ω	R177		600-020271
Resistor		820Ω	R168		600-020471
Resistor		1K	R171, 178		600-020491
Resistor		1.2K	R158		600-020511
Resistor	5%	6.8K	R162		600-020692
Resistor		8.2K	R175		600-020711
Resistor		10K	R152, 156, 169, 180		600-020731
Resistor		15K	R176		600-020771
Resistor		22K	R159, 174		600-020811
Resistor		39K	R151		600-020871
Resistor		47K	R155, 157, 167, 179		600-020891
Resistor		82K	R153		600-020951
Resistor		100K	R163, 166, 172		600-020971
Resistor		220K	R154		600-021051
Resistor		330K	R165		600-021091
Resistor	5%	82Ω	R170		600-020232
Resistor	5%	5.6K	R161		600-020672
Capacitor Electrolytic		100mfd	50v	C153	407-060069
Capacitor Electrolytic		1mfd	25v	C152	407-060119
Capacitor Electrolytic		500mfd	3v	C161	407-010279
Capacitor Tantalum		1mfd	25v	C163,160	414-040092
Capacitor Tantalum		6.8mfd	25v	C154, 155, 165	414-040222
Capacitor Mylar		.01mfd	100v	C157	413-010072
Capacitor Mylar		.047mfd	100v	C156	413-110112
Capacitor Mylar		.1mfd	100v	C151	413-110142
Capacitor Mylar		.22mfd	100v	C158	413-110162
Capacitor Ceramic		220pf	500v	C164	425-010332
Capacitor Ceramic		680pf	500v	C159	425-010462
Capacitor Ceramic		100pf	500v	C166	425-010252
Zener Diode		1 watt	15v	D151	001-023034
Silicon Diode		250mw		D152	001-026010
Transistor		Q151, 152, 154, 155			001-021070
Transistor		Q157, 158, 159			001-021133
Field Effect Transistor		Q153			001-027010
Potentiometer		100K	R160		676-000023

PERCUSSION AMPLIFIER ASSEMBLY (AO-72) 126-000039 (BELOW SERIAL NO. 15000)

Chassis Pan Assembly			009-030276
Percussion Transformer and Plug Assembly			063-038634
Pedal Transformer and Plug Assembly			063-030258
Tube	12AU7	V103, 106	002-012300
Tube	12AX7	V101, 104	002-000001
Tube	12AX7 (Green)	V102, 105	002-012301
Tube Shield			010-022082
Potentiometer	100K	R113,143	676-000105
Potentiometer	10K	R110, 120, 139, 160	676-000143

Potentiometer	250K		R126, 156		676-000146
Capacitor, dual electrolytic			50mfd/200v. 100mfd/300v	C124	450-030104
Resistor	6.8K		R163		600-030691
Resistor	500Ω		R162		626-060291
Resistor	4.5K		R164		626-060741
No. 1 Percussion Board and Components Assembly					063-030066
Terminal Board and Lug Assembly					006-028765
Resistor	470Ω		R124		600-020411
Resistor	820Ω		R109, 127		600-020471
Resistor	4.7K		R107, 108		600-020651
Resistor	10K		R104		600-020731
Resistor	39K		R105		600-020871
Resistor	47K		R118, 122, 128, 125		600-020891
Resistor	100K		R102, 106		600-020971
Resistor	150K		R116		600-021011
Resistor	1 Meg.		R129		600-021211
Resistor	2.2 Meg.		R123, 130		600-021291
Resistor	56K	5%	R119, 121		600-020912
Resistor	390K	5%	R115, 117		600-031112
Resistor	180K		R111		600-031031
Diode, Zener	6.2 Volt	10%	D102		001-023033
Capacitor	1mfd	100v	C102		420-010113
Capacitor	.1mfd	400v	C108		422-032032
Capacitor	.47mfd	400v	C104, 105		422-032092
Capacitor	.0047mfd	500v	C103		425-010662
Capacitor	.01mfd	500v	C106		425-010752
Capacitor	.02mfd	500v	C107, 109		425-010763
Silicon Diode					001-026010
No. 2 Percussion Board and Components Assembly					063-030017
Terminal Board and Lug Assembly					006-028765
Resistor	470Ω		R154		600-020411
Resistor	820Ω		R138, 157		600-020471
Resistor	10K		R137, 140, 144		600-020731
Resistor	47K		R148, 152, 155, 166		600-020891
Resistor	33K		R132		600-020851
Resistor	150K		R146		600-021011
Resistor	1 Meg.		R158		600-021211
Resistor	1.5 Meg		R135		600-021251
Resistor	2.2 Meg.		R150, 153		600-021291
Resistor	56K	5%	R149, 151		600-020912
Resistor	390K	5%	R145, 147		600-031112
Resistor	180K		R165		600-031031
Capacitor	.0015mfd	500v	C118		425-010542
Capacitor	.47mfd	400v	C115		422-032092
Capacitor	.0056mfd	500v	C114		425-010682
Capacitor	.02mfd	500v	C117, 119		425-010763

POWER AMPLIFIER ASSEMBLY (H-300)* 126-000069
POWER AMPLIFIER ASSEMBLY (AO-70) 126-000050

Chassis Pan Assembly			009-030209
Output Transformer (Channel A and B)		T301, 302	003-036551
Bass Output Transformer		T304	003-030212
Potentiometer	Dual 1 Meg.	R337, 351	676-000143
Potentiometer	500K	R319	676-000152
Potentiometer	1 Meg.	R407	676-000104
Potentiometer	10K	R417	676-000264
Potentiometer	Dual 1 Meg.	R340, 378	676-000263

Resistor		10Ω	R355, 382, 410	600-020011
Resistor		180Ω	R304	600-020311
Resistor		560Ω	R338, 341, 360, 387	600-020431
Resistor		820Ω	R324, 327, 354, 381	600-020471
Resistor		1K	R307, 366, 368, 393, 395, 414, 422, 423	600-020491
Resistor		1.5K	R308	600-020531
Resistor		1.8K	R303	600-020551
Resistor		2.2K	R318	600-020571
Resistor		1.2K	R347	600-020511
Resistor		4.7K	R363, 389	600-020651
Resistor		10K	R353, 380, 408, 419, 420	600-020731
Resistor		22K	R359, 386	600-020811
Resistor		47K	R316, 356, 383, 411	600-020891
Resistor		100K	R339, 342, 405, 406	600-020971
Resistor		820Ω	R409	600-020511
Resistor		220K	R317, 357, 358, 384, 385, 412, 418, 421	600-021051
Resistor		270K	R305, 335, 336, 413	600-021071
Resistor		470K	R302, 306, 315, 361, 365, 367, 388, 392, 394, 403, 404	600-021131
Resistor		2.2 Meg.	R346	600-021291
Resistor		1 Meg.	R320, 322, 326, 349, 350, 376, 377, 425	600-021211
Resistor		4.7 Meg.	R343	600-021371
Resistor	1 Watt	4.7K	R370, 397	600-030651
Resistor	1 Watt	1.8K	R433	600-030551
Resistor	1 Watt	5.6K	R430	600-030671
Resistor	1 Watt	10K	R325, 328, 424	600-030731
Resistor	1 Watt	47K	R362, 364, 390, 391	600-030891
Resistor	2 Watt	200Ω	R431	600-040331
Resistor	2 Watt	10K	R344, 345	600-040731
Resistor	2 Watt	15K	R415, 416	600-040772
Resistor		10Ω	R425, 426	600-020753
Resistor		270Ω	R369, 371, 396, 398	602-050072
Resistor		500Ω	R432	626-060291
Capacitor	1mfd		C316	421-021113
Capacitor	.047mfd		C302	422-032022
Capacitor	.1mfd		C310, 314, 369, 370	422-032032
Capacitor	.22mfd		C320, 322	422-032052
Capacitor	.033mfd		C321	413-010102
Capacitor	100pf		C334, 352, 361	425-010252
Capacitor	300pf		C331, 349	425-010362
Capacitor	470pf		C362, 363, 364	425-010412
Capacitor	.0012mfd		C306	425-010522
Capacitor	.0015mfd		C328, 329, 330, 346, 347, 348	425-010542
Capacitor	.0022mfd		C367	425-010582
Capacitor	.0047mfd		C365	425-010662
Capacitor	.01mfd		C333, 351	425-010752
Capacitor	.02mfd		C309, 313, 315, 337, 338, 353, 354 335, 355, 374	425-010763
Capacitor	15pf		C308	425-010051
Capacitor	.001mfd		C340, 357, 373	425-030503
Capacitor	100mfd	3v	C307, 375	407-010029
Capacitor	50mfd	10v	C318, 319	407-030089
Capacitor	20mfd	50v	C332, 350, 366	407-080048
Capacitor	100mfd	50v	C339, 341, 356, 358	407-080069
Capacitor	20mfd	350v	C303	450-040087
Capacitor, electrolytic		30/400, 30/350, 30/350, 20/350	C401A, 401B, 401C, 401D	450-040301
Zener Diode	10 Watt	24 Volt		001-023021
Tube	V306, 307, 309, 310		6BQ5	002-006700

Tube	V303, 304	12AU7	002-012300
Tube	V302	EF86/6267	002-006503
Tube	V305, 308, 311	7199	002-006402
Tube	V301	7247	002-006307
Tube	V312, 313	7591	002-006704
Tube Shield			010-041481
Strain Relief			013-032683
Choke	L301		003-024159

* There are two changes between 126-00050 and 126-000069.
In the 126-000069 C331 and C349 are 100pf.
They were 300pf.

POWER SUPPLY ASSEMBLIES

Power Supply Assembly		H-100/262	120 Volt	60 Hz.		127-000025
Power Supply Assembly		H-100/262	120 Volt	50 Hz.		127-000026
Power Supply Assembly		H-100/262	234 Volt	50/60 Hz.		127-000027
Power Supply Assembly		H-300	120 Volt	60 Hz.		127-000035
Power Supply Assembly		H-300	120 Volt	50 Hz.		127-000036
Power Supply Assembly		H-300	234 Volt	50/60 Hz.		127-000037
Chassis Pan Assembly						009-030240
Power Transformer			120 Volt	60 Hz.		003-030241
Power Transformer			120 Volt	50 Hz.		003-038632
Power Transformer			234 Volt	50/60 Hz.		003-038633
Filter Choke Assembly			L701, 702			003-036864
AC Cord and Plug Assembly						011-033233
Strain Relief						013-034998
Tube	5AR4/GZ34		V701, 702			002-005200
Transistor			Q703			001-021172
Transistor			Q706			001-012050
Insulator	(For Q706)					036-030552
Transistor			Q701, 702			001-021100
Transistor			Q704, 705			001-012020
Silicon Rectifier			D705	6.2 Volt D70l,702,703,706	10%	001-024051
Zener Diode			D705	6.2 Volt 10%		001-023033
Zener Diode			D704	10 Volt 10%		001-023035
Capacitor Electrolytic			C704	100mfd 50V		407-080069
Capacitor Electrolytic			C703	40/400 100/350 100/150		450-040096
Capacitor Electrolytic			C702	50/450 50/450		450-040401
Capacitor Electrolytic			C706	1500/50v		450-010079
Capacitor Electrolytic			C705	100/50v		407-070159
Capacitor Electrolytic			C701	.0022mfd		425-030583
Resistor	820Ω	1 Watt	R713			600-040471
Resistor	560Ω	10 Watt	R701			604-070281
Resistor	4.5K	10 Watt	R703, 704			604-070701
Resistor	270K		R716			600-021071
Resistor	500Ω		R707			602-050111
Resistor	10K		R702			604-070481
Resistor	22Ω	1 Watt	R723			600-030071
Resistor	220Ω	1 Watt	R711			600-030691
Resistor	110Ω		R726			600-020261
Resistor	18Ω	1 Watt	R722			600-030091
Resistor	15K		R715			600-020771
Resistor	150Ω		R706			600-020291
Resistor	82K		R720			600-020951
Resistor	33K		R721			600-020851
Resistor	820K		R717			600-021191
Resistor	680Ω	1 Watt	R725			600-040451

Resistor	2.7K		R718		600-020591
Resistor	10K		R712		600-020731
Potentiometer		1K	R714		676-000107
Potentiometer		50Ω	R724	2 Watt	676-020255

SWELL PEDAL ASSEMBLY H-100 123-000023

Shutter Assembly	060-033749
Light Bulb Socket and Connector Pin Assembly	016-039541
Photocell Housing Base Assembly	040-033601
Photocell Housing Cover	025-032881
Photo Electric Cell	040-031873
Photo Electric Cell Adapter	025-030102
Extension Spring	012-030154
Light Bulb	016-031748
Diffuser	016-030153

SWELL PEDAL ASSEMBLY H-300 123-000052

Swell Pedal Bracket and Stop Assembly	060-030182
Shutter Assembly	060-033749
Light Bulb Socket and Pin Assembly	016-038541
Photocell Housing Base Assembly	040-033601
Photocell Housing Cover	025-032881
Photo Electric Cell	040-031873
Photo Electric Cell Adapter	025-030102
Extension Spring	012-030154
Pedal Assembly	123-000049
Pedal and Mat Assembly	060-030149
Down Stop Bumper	025-040138
Switch Cover	041-042722
Side Pedal and Switch Assembly (Vibrato Cancel)	060-044454
Switch Assembly	008-042438
Side Pedal and Switch Assembly (Rhythm Cancel)	060-044495
Switch Assembly	008-042438

VIBRATO LINE ASSEMBLIES

Vibrato Line Assembly			121-000114
Channel Assembly			060-029028
Mounting Bracket			035-030588
Tie Rod			020-031439
Compression Spring			012-022439
Cup Washer			041-022433
Universal Coil			003-033303
Spacer (Mylar)			044-031588
Cup Core			024-022427
Ferrite Washer			024-022451
Capacitor	.001mfd		406-010262
Capacitor	.0022mfd	(15 used)	406-010022
Capacitor	.015mfd		406-010082
Resistor	22K		600-020311
Resistor	33K		600-020851
Resistor	39K		600-020871

VIBRATO LINE ASSEMBLY 121-000115

NOTE: Refer to 121-000114 For Components. 121-000115 has No Resistors.

CELESTE LINE BOX ASSEMBLY 121-000098

Universal Coil (16 Used)		003-033303
Spacer (Mylar) (16 Used)		044-031588
Cup Core (16 Used)		024-022427
Ferrite Washer (2 Used)		024-022451
Capacitor	.0056 mfd (8 Used)	406-010232
Capacitor	.022mfd (8 Used)	406-010332
Resistor	1800Ω	600-020551
Resistor	5600Ω	600-020671
Cover		009-031894
Celeste Scanner Assembly	120/234 60Hz	121-000094
Celeste Scanner Assembly	120/234 50Hz	121-000095
Vibrato Scanner Assembly	120/234 60Hz	121-000096
Vibrato Scanner Assembly	120/234 50Hz	121-000097
Vibrato Scanner Assembly (Above Serial No. 15000)		121-000067
Scanner Conversion Kit Assembly	120v 60Hz	103-000356
Vibrato Scanner (New Style)		066-042600
Celeste Scanner (New Style)		066-044458

WOODWORK

MODEL H–111	
Cabinet Assembly	111-000050
Case Assembly	050-000221
Top Panel and Music Rack	050-000235
Music Panel	050-000228
Bench	152-000039
Baffle Panel and Grille Cloth Assembly	052-038769
Rear Cover	056-040215
MODEL H–112	
Cabinet Assembly	111-000051
Case Assembly	050-000222
Top Panel and Music Rack	050-000236
Music Panel	050-000229
Bench	152-000040
Baffle Panel and Grille Cloth Assembly	052-038770
Rear Cover	056-040214
MODEL H–133	
Cabinet Assembly	111-000052
Case Assembly	050-000223
Top Panel and Music Rack	050-000237
Music Panel	050-000230
Bench	152-000041
Baffle Panel and Grille Cloth Assembly	052-038771
Rear Cover	056-040217
MODEL H–143	
Cabinet Assembly	111-000053
Case Assembly	050-000224
Top Panel and Music Rack	050-000238
Music Panel	050-000231
Baffle Panel and Grille Cloth Assembly	052-038772
Rear Cover	056-040220
MODEL H–182	
Cabinet Assembly	111-000054
Case Assembly	050-000225
Top Panel and Music Rack	050-000239
Music Panel	050-000232
Bench	152-000043

Baffle Panel and Grille Cloth Assembly	052-038773
Rear Cover	056-040217
MODEL H–195	
Cabinet Assembly	111-000055
Case Assembly	050-000226
Top Panel and Music Rack	050-000240
Music Panel	050-000233
Bench	152-000044
Baffle Panel and Grille Cloth Assembly	052-038774
Rear Cover	056-040219
MODEL H–262	
Cabinet Assembly	111-000082
Case Assembly	050-000370
Roll Top	050-000374
Music Panel	050-000376
Top Panel and Music Rack	050-000372
Rear Panel	050-000375
Bench	152-000035
MODEL H–324	
Cabinet Assembly	111-000121
Case Assembly	050-001950
Top Panel and Music Rack	050-002000
Music Panel	050-001981
Bench	152-000050
Baffle Panel and Grille Cloth Assembly	052-044377
Rear Cover	056-044465
MODEL H–382	
Cabinet Assembly	111-000122
Case Assembly	050-002050
Top Panel and Music Rack	050-002001
Music Panel	050-000232
Bench	152-000043
Baffle Panel and Grille Cloth Assembly	052-044378
Rear Cover	056-044465
MODEL H–395	
Cabinet Assembly	111-000123
Case Assembly	050-002150
Top Panel and Music Rack	050-002002
Music Panel	050-000233
Bench	152-000044
Baffle Panel and Grille Cloth Assembly	052-044379
Rear Cover	056-044465

MISCELLANEOUS

Speaker 8" (Channel A) 8Ω	014-028678
Speaker 8" (Channel B) 8Ω	014-028677
Speaker 15" (Bass) 4Ω	014-028923
Speaker 15" (Bass) 54Oz Magnet 4Ω (H-300)	014-044213
*May be Used as Replacement for 014-028923	
Generator Assembly 60Hz	113-000005
Generator Assembly 50Hz	113-000006
Synchronous Motor 120v 60Hz	021-037611
Synchronous Motor 120v 50Hz	021-037612
Synchronous Motor 234v 60Hz	021-037613
Synchronous Motor 234v 50Hz	021-037614

Generator and Motor Assembly	120v	60Hz	H-300		112-000029
Generator and Motor Assembly	120v	50Hz	H-300		112-000030
Generator and Motor Assembly	234v	60Hz	H-300		112-000031
Generator and Motor Assembly	234v	50Hz	H-300		112-000032
Motor Capacitor	120v	50/60Hz			499-033807
Motor Capacitor	234v	50/60Hz			499-033805
Capacitor Clamp					013-024313
Motor Clamp					013-024427
Motor Coupling Spring					012-029132
Motor Coupler					017-024242
Oval End Cap (Motor Capacitor)					041-024838
Motor Pulley					022-030295
"O" Ring (Motor To Celeste Scanner)					043-030297
Ballast Assembly	120v	60Hz	H-100		003-038710
Ballast Assembly	120v	50Hz	H-100		003-038711
Ballast Assembly	234v	60Hz	H-100		003-038712
Ballast Assembly	234v	50Hz	H-100		003-038713
Transformer Assembly (Music Light)	120v	60Hz	H-300		003-044484
Transformer Assembly (Music Light)	120v	50Hz	H-300		003-044481
Transformer Assembly (Music Light)	240v	50/60Hz	H-300		003-044480
Top Cover Assembly (FR-2S Rhythm Unit and Music Light)			H-300		
Top Cover Assembly	H-324				125-000060
Top Cover Assembly	H-382				125-000061
Top Cover Assembly	H-395				125-000062
Rhythm Unit Assembly Only (FR-2S)					125-000054
Knob (Tempo and Volume)					031-042578
Music Light Components					
Lampholder-Hinge Wiring Assembly					063-044299
Lamp, 14v (17 Used)					016-031749
Diffuser Lens					016-043749
Music Light Lens					026-044391
Music Light Switch					008-044344

H-100 MUSIC LIGHT ASSEMBLY

Left Hand Bracket	035-039751
Right Hand Bracket	035-039752
Switch Bracket	035-030417
Fluorescent Lamp	016-030407
Pin Housing	005-039094
Starter Socket Base Plate	041-030420
Starter Box Cover	041-039759
Starter Socket	004-030409
Capacitor, Ceramic .02 500v	425-010763
Light Shield	041-030366
Starter	063-030408
Light Diffuser	016-030461
Ballast	003-038710
Light Switch Assembly	008-038734
Capacitor, Mylar .22 400V	422-032052
Terminal Strip	006-034306
Grommet	043-020675
Screw for Light Shield	938-050338
Light Cable Assembly	011-035287
Brown Male Plug	005-039911
Brown Female Plug	005-039941
Male Pin	007-030735
Female Pin	007-030734

PRESET PANEL ASSEMBLY 060-040880

Bus Bar Insulator and Rod Assembly	062-021364
Preset Panel Mounting Bracket	035-027855
Marker Plate Upper Manual	038-036049
Marker Plate Lower Manual	038-036050
Bus Bar (16 Used)	029-036052
Bus Bar (2 Used)	029-036051
Lockwire (18 Used)	013-023243
Outlet Panel (Fiber Wireguide)	006-021361
Binder Head Machine Screw (108 Used)	847-000001

INSTALLATION AND MAINTENANCE INSTRUCTIONS

INSTALLATION

Connect only to power supply of voltage and frequency shown on name plate. And place console at least 2 inches from wall for ventilation and for best acoustic results. If organ has a tone cabinet, see card on cabinet for additional instructions.

The generator in this organ is permanently mounted and requires no loosening of shipping bolts.

OILING

Lubricate the tone generator and motor once a year according to instruction plate at rear of console. Use the chart at right as a reminder. Use only the oil supplied with the organ. When supply is exhausted, you may purchase additional oil from your dealer or direct from the factory.

DATE OILED

MAINTENANCE

With the exception of regular oiling, the organ will require little attention. If it should need servicing, call your Hammond dealer or write to the factory.

IMPORTANT: Always supply model designation and serial number when writing.

CLEANING

Plastic Keys and Controls: Clean lightly with a soft, damp cloth or chamois. Wiping with a dry cloth builds up an electrostatic charge that attracts dust. Use mild soap and lukewarm water if necessary; dry without excessive rubbing. Do not use boiling water or strong solvents such as alcohol, dry cleaning fluids and window cleaning fluids.

Woodwork: Dust with a soft, damp cloth or chamois. If necessary, dampen cloth lightly with a solution of mild soap and likewarm . water. Remove solution by using a soft cloth dampened in clean water. Dry thoroughly, rubbing with the grain. Use a good grade of furniture wax or polish, preferably liquid. Avoid use of paste waxes or oily polishes. Excessive rubbing in one spot or at edges may damage finish.

MOVING OR SHIPPING

Remove the pedals by raising slightly and sliding them back. If the organ has a tone cabinet, disconnect the console-to-cabinet cable. See card on tone cabinet.

IMPORTANT: If the organ is to be shipped by a carrier other than a regular furniture mover, arrange with your local Hammond dealer to have it properly packed.

HAMMOND ORGAN COMPANY
4200 W. DIVERSEY AVENUE CHICAGO 39, ILLINOIS U. S. A.

HO-426

PRINTED IN U.S.A. 8/72 1M
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Hammond Service News Volume 3 Number 5

August, 1971

Model H, X-77, X-77GT

SUBJECT: REPLACEMENT OF PEDAL SWITCH ACTUATOR

1. Remove pedal switch assembly from console.
2. Remove screws from L shaped cover so as to gain access to solenoid assemblies.
3. Turn pedal switch so pedal solenoids face up, key contacts face forward.
4. Take note of position of actuator to be replaced.
5. Remove end cover furthest away from defective actuator.
6. Remove two solenoid locking wires far enough to free solenoid mechanically.

NOTE
When removing locking wires, be sure to twist rods as they are being removed so as not to disengage rubber grommet insulators.

7. Carefully remove, by lifting and rotating over plunger, the solenoid assembly.

NOTE
Care must be taken when rotating solenoids so that the small doughnut spacer does not fall out of the solenoid assembly. If it should come out, make sure to replace before assembly.

8. In order to remove the key contact moveable separtor, it is necessary to disengage the ten (10) key contacts and pull them out of the assembly approximately 1/2 to 3/4 of an inch.
9. Carefully lift out the moveable contact holder and set aside.
10. Lift out T shaped white colored plastic actuator and replace. Reassemble in reverse order.

Hammond Service News Volume 3 Number 5

August, 1971

Model E, H, R, X-77
X-77GT

SUBJECT: PEDAL DAMAGE

The problem generally exhibits itself as little or no top safety on the pedal notes. A possible cause may be the method of movement used when delivering unit to customer or moving from one location to another within your own facilities.

Proper organ dollies should be used to move these instruments. In cases where certain types of piano dollies have been used, the majority of weight of the organ rests upon the pedal switch and pedal angle. The result is an apparent cyphering because the top safety has been lost or reduced due to upward distortion of the pedal switch assembly.

The organ load, when moved properly, should be transmitted to the cabinet end panels.

Technical Bulletin

HAMMOND ORGAN
"music's most glorious voice"

TO ALL MAINTENANCE ENGINEERS – CHANGES — NO. MODELS

SUBJECT: KEY STANDARDIZATION - H-100
IMPROVED AMPLIFIERS - H-100
INITIAL OILING - H-100

51 H-100

Because of procurement problems it has become necessary to standardize all overhanging keys so that the key PO-24120 currently used on the L-100, M-100 and E-100 will be incorporated on all H-100 consoles.

We will however, maintain a stock of the Malamine key previously used on the H-100 series, part #PO-28810. We recommend that you also maintain a stock of at least one octave of each of these two types for replacement purposes.

While they appear very similar, the sketch below - Figure 1 - indicates the differences in the physical shape of these two keys. Note the contour difference and the fact that they require different mounting screws.

Figure 2 shows new schematics for the Vibrato and Non-Vibrato boards used in the current H-100 series instruments. The Non-Vibrato board is similar to the board previously used, but does require that the +20 volt supply (orange wire) be attached to the third lug from the top when this board is installed. All other connections remain the same as the previous Non-Vibrato board.

The vibrato drive board - Figure 3 - differs significantly from the board previously used. All connections and terminals, however, are identical.

On October 8, 1964 we issued a technical bulletin #14 which outlined a new type oiling tube and procedures. These instructions are now modified as follows.

OIL →

Henceforth, we recommend that all organs equipped with self-starting synchronous motors be oiled as soon as they are uncrated. Fill both motor oil cups three (3) times and the generator cups once. Since most new consoles incorporate snap-off backs, this operation is now easily accomplished and should be done as a routine matter.

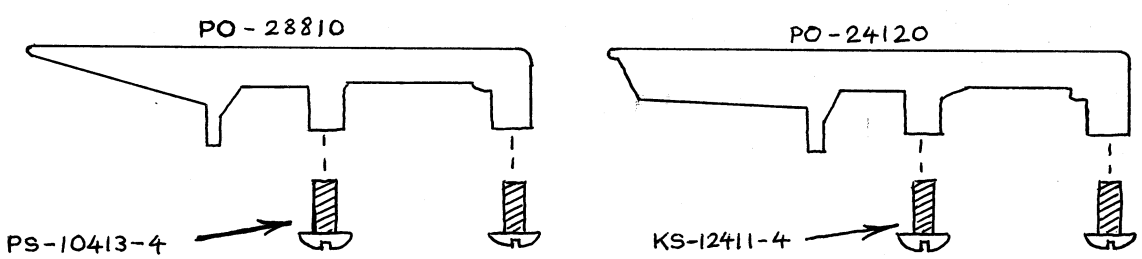


FIGURE # 1

NOTE: This bulletin is a confidential letter to the Hammond dealer organization and is not for general distribution.

HAMMOND ORGAN COMPANY, 4200 W. DIVERSEY AVE., CHICAGO, ILL., 60639

NON-VIBRATO BOARD

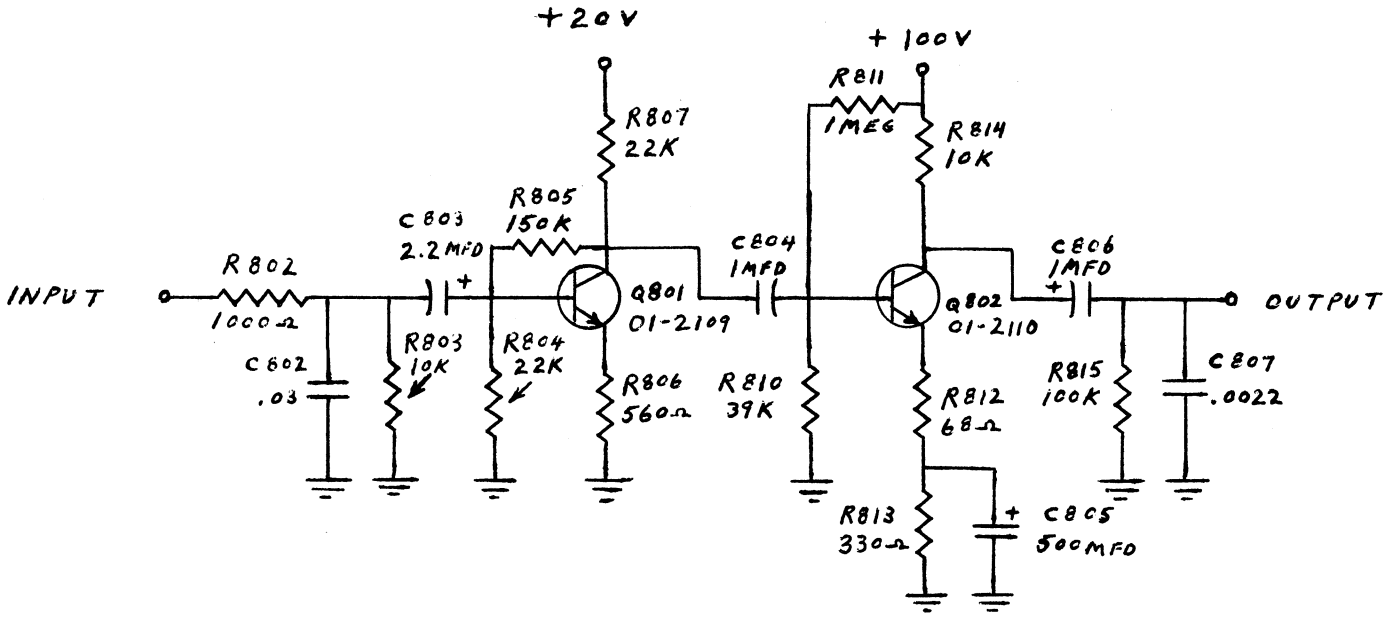


FIGURE #2

VIBRATO DRIVE BOARD

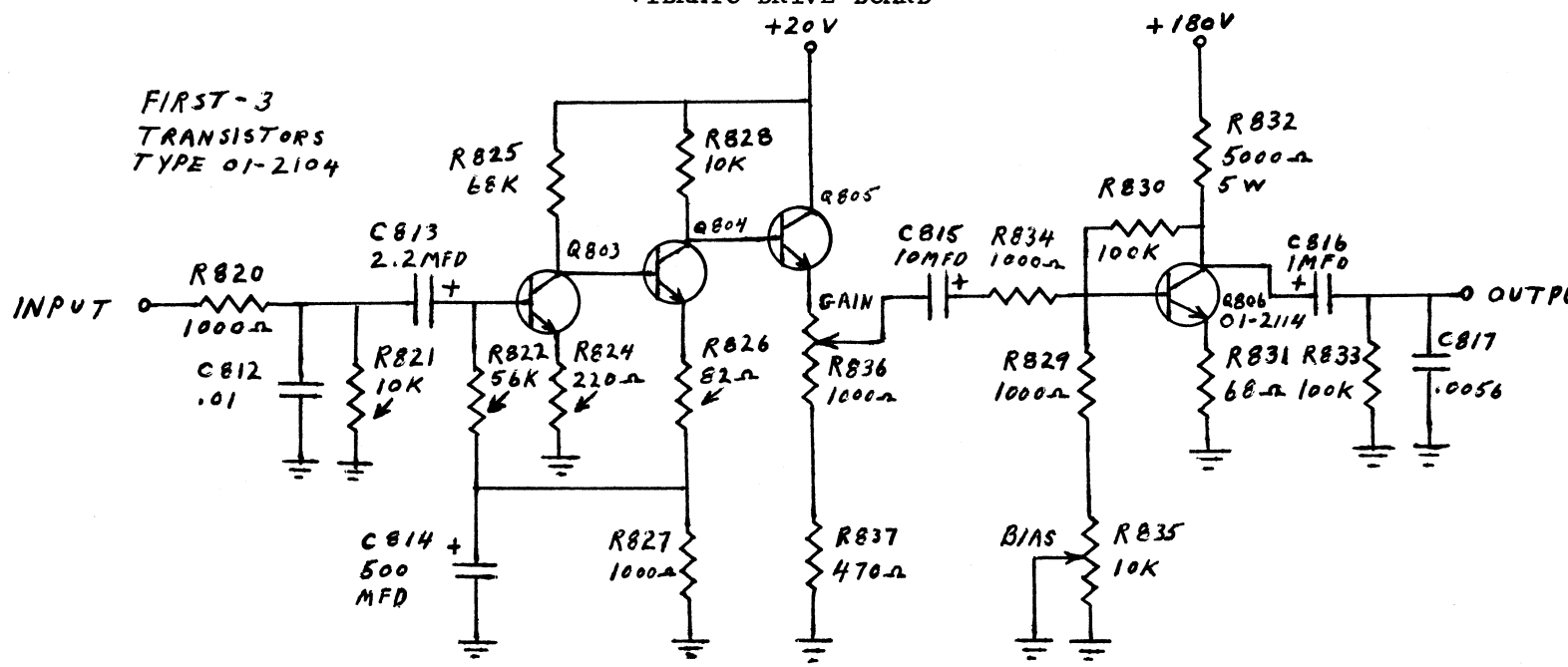


FIGURE #3

Hammond Service News Volume 1 Number 3

Model H-Series
X-77

SUBJECT: H & X-77 PEDAL SWITCH ASSEMBLY

It has been noted on early Model H organs that you can run into a condition of harmonic drop-out when String Bass is being used. Most servicemen will begin trouble-shooting this problem with the analysis that the latching solenoid simply has not latched. This will lead them to believe the problem is a voltage adjustment or solenoid malfunction.

However, the problem stems from the fact that there is a considerable tension difference in the contact to bus bar connection when a person manually plays a pedal versus that of a latching solenoid in String Bass operation. We have found incidents of the pedal not sustaining in String Bass operation. This malfunction could be due to:

1. Mis-adjustment of the solenoid voltage
2. Bad latching solenoid
3. Dirty contacts.

Where voltage or solenoid is not the problem, shift the pedal bus bar and notice whether there is improvement in the operation. If improvement is evident, lubrication of pedal signal busses should provide permanent correction.

This process is a 1/2 hour to 45 minute job, since the pedal switch assembly is easily accessible. In the switch assembly it will be noted that there are 6 bus bars, only the center four of which are signal bus bars. It is these four which should be lubed, the other two are for latching and cymbal keying.

Model E-100
H-100

SUBJECT: HARP CIRCUIT CIPHERS

E-100: Cipher present only when upper manual DRAWBAR/PERCUSSION tab is depressed.

Depress ADD VIBRATO tablet. If vibrato is added to cipher, harp keyer problem is indicated.

FINDING THE CIPHER

There are 49 harp effect keyers, starting at C2 (playing key 13) of the upper manual, and ending at key #61.

These harp keyers will be referred to as numbers 1 through 49 for the sake of simplicity, although they do not correspond to the generator frequencies used to produce the harp effect, nor to the numbering system used in the service manuals.

Locate the harp keyer number by starting at either the high end of the keyboard, or C2 (key 13), whichever is closest to the pitch of the cipher. Depress the HARP SUSTAIN tablet and count the number of keys between the starting point and the key which zero beats, in pitch, with the cipher.

Example: The fifteenth key above C2 (key 13) zero beats, in pitch, with the cipher. C2 (key 13) is Harp Keyer #1. One plus 15 = 16. Therefore, Harp Keyer #16 is at fault.

Conversely, if key #5 (counting down from key 61) zero beats, in pitch, with the cipher, Harp Keyer #44 is at fault. (49 minus 5 = 44).

Position Harp Assembly so that all terminals are easily viewed, and so that the shielded cables are at the bottom left of the harp frame.

The Harp Keyers are numbered from top to bottom with the 49th keyer the bottom-most of the group of 5 keyers on the left-hand printed wiring board. Keyer #1 is at top right of the frame.

There are two terminal posts for each keyer. The one on the left side of the P.W.B. is the signal input - the one on the right - keying. All wires to signal input terminals are of one color. Two colors are alternated in the keying cabling. No specific colors are given as the color of the wiring has changed several times.

Use a jumper with alligator clips at each end, and ground the signal input terminal of the suspect keyer to the generator frame. The cipher should now stop.

Next, unwind the wire-wrap to the keying terminal of the suspect keyer and check for voltage between the disconnected wire and ground. There should be zero volts with no key depressed. If voltage is present (approx. 100 V DC), this indicates an internal manual short between the Brush/Cymbal keying and Harp keying busses. In most cases, no voltage will be read and the transistor in the keyer circuit may be replaced.

Insure that all removed wires are <u>soldered</u> back on.

Model H-100, H-262

SUBJECT: PEDAL "POP" OR CLICK

Reference: Hammond Service News, Vol. 1, No. 9, H-100

On Page 4 of the green bulletin there is a wiring diagram showing lead replacements using shielded wire.

As of February 10, 1970, the modification illustrated has been incorporated into production of H-100 and H-262.

Model H-100/262, X-77/GT

SUBJECT: POWER SUPPLY

REFERENCES: H-100 Service Manual, HO-426, February 1970, Figure 52
X-77 Service Manual, HO-703, December 1969, Figure 41

In order to accommodate a change in the windings of pedal latching solenoids in recent production, the values of R722 and R723 have been interchanged. R722 is now 22 ohms; R723 is now 18 ohms. Wattage remains unchanged.

Model H-100
Below Serial No. 15,000

SUBJECT: SPORADIC CRACKLING NOISE

Crackling noise in Channel A, B, and/or Bass Channel, which occurs variously - during warm-up - while operating - or at turn-off, may be caused by defective decoupling capacitors in the 7199 stages of the Power Amplifier (A0-70-1).

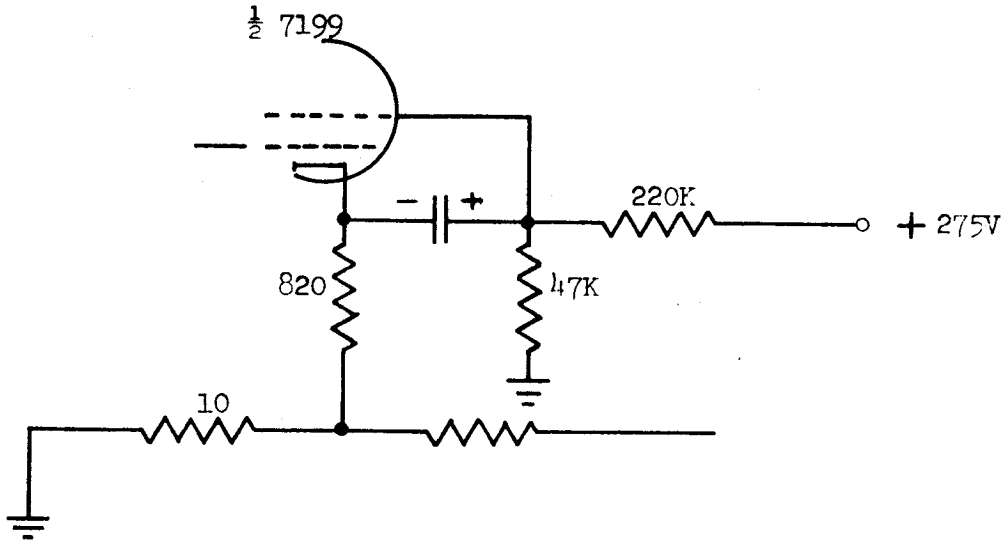
These capacitors are C-332, C-350 and C-366. They are non-polarized types, rated at 20 MFD/50V.

It is assumed that tube replacement has been tried and that the instrument will be left "On" during the following tests.

In most cases the faulty capacitor can be detected by allowing the instrument to fully warm up, then removing the 7199 associated with the troublesome channel. Allow the tube to cool for about 10 seconds. If "turn-on" or "operating" noise is the symptom, you should hear the crackling upon reinsertion of the tube.

If "warm-up" noise is the problem, remove the 7199 from the noisy channel and allow it to cool completely before reinserting into the socket, or use a fresh, known good, tube. Run through the applicable test above at least twice to be sure of your diagnosis, then replace all three capacitors to avoid repeat calls.

The capacitors may be replaced by non-polarized local purchase items or from Hammond Organ Company (Part #407-080229), or by standard polarized types which are more readily available. Observe polarity when polarized replacements are installed. See sketch below.



Model H-100
Serial Nos. below
15,000

SUBJECT: CABLE CONNECTIONS FOR H SCANNER EXCHANGE

The early H-100 scanners had 32 plates which terminated in a 17- wire cable. The current replacement scanner has 16 plates which terminate in a 9-wire cable. The new scanner can be used in place of the earlier one by connecting the following wire colors together.

Scanner wire color	Wire color in console
Brown	Brown
Red	Orange
Orange	Green
Yellow	Violet
Green	White
Blue	White/Brown Tr.
Violet	White/Orange Tr.
Grey	White/Green Tr.
White	White/Violet Tr.

The wires which are left over in the console cable should be pulled back out of the way and taped up, since they are not used.

The above information supplements text in H-100 Service Manual, HO-426, Feb. 1970, Page 53D.

Hammond Service News Volume 2 Number 10
January, 1971

Model H-300,
In-built Rhythm

SUBJECT: FIELD CORRECTION OF COW BELL CYPHER IN FR2S RHYTHM UNIT IN H-300 CONSOLES

This effect can be corrected as follows without an oscilloscope by slightly adjusting one or two potentiometers in the rhythm unit:

1. Remove console top assembly (including music rack, rhythm unit, and light assembly) from console by removing two (2) Hex screws, disconnecting ground wire, and disconnecting light plug and rhythm plug.

2. Lay top assembly upside down and remove four (4) Phillips head screws from underside of light rail.

3. Slip off the black light housing.

4. Pull off the two rhythm knobs.

5. Remove seven (7) Hex head screws (only three (3) on later models) from the surface below the row of lamps.

6. Remove four (4) Hex head screws securing rhythm unit to underside of top cover.

7. Lift out rhythm unit and remove cover.

8. Reconnect rhythm unit to console (insert rhythm plug and connect ground wire).

9. Depress the Cha-Cha rhythm button.

10. Slightly adjust potentiometer VR8 adjacent to inductor L5 and/or potentiometer VR9 adjacent to inductor L7 on the instrument generator board (see Fig. 2 of Auto Rhythm Manual) to eliminate the sustained whistle, being careful not to make too great an adjustment such that the cow bell sound is inaudible.

11. Replace cover and reinstall the rhythm unit into the console top and reconnect to the console.

Hammond Service News Volume 3 Number 2
May-June-July

Model H-300

SUBJECT: LEVEL SETTINGS

1. Channel A and B - Output levels to be set at 700 Millivolts (.7 Volts).

2. Vibrato - Set level at .7 Volts.

3. Tone Setting - Turn control fully clockwise (maximum).

4. Bass setting - Set to 1.5 Volts.
   (Same as H-100 Series).

NOTE: The setup conditions are identical to those described in the H-100 Series manual. Only the output levels mentioned above differ.

Hammond Service News Volume 3 Number 12

March, 1972

Model H-100

SUBJECT: H-100 TONE CABINET LEVEL SET AID

Level Setting Instructions for the H-Series instrument require the use of a 47K resistor as a load across the tone cabinet outlet terminals, to simulate the actual cabinet. The load resistor is to be placed across the input terminals of the AC VTVM with which the measurements are to be made. Unfortunately, several meter manufacturers use screw-on microphone type connectors at the meter end of the probe's cable, which precludes any such arrangement.

To solve this problem, obtain an Amphenol #86-PM711 (or Equivalent) plug assembly. Drill out pins 2 and 6 so that the guide pins of the Tone Cabinet outlet will fit through. Two 47K, ½ watt, resistors are then fitted to the rear of the plug (pictorial).

Attach three color coded wires, complete with mini-gator clips and insulating sleeves, and thread through the hole in the snap-on plug shell. The shell acts to protect the wiring and as a handle to ease insertion and removal of the adapter.

